TOOLING & PRODUCTION

SEPTEMBER 1960

The Magazine of Metal Working Methods

PREVIEWING CHICAGO SHOWS

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Newest Numeric Tape Controlled Drilling and Tapping Machine . . . page 70

Tool Steel Troubleshooting . . . page 53

Face Up To Ceramics . . . page 64

Progressive Blind Hole Broaching On A Press . . . page 65

Complete Table of Contents
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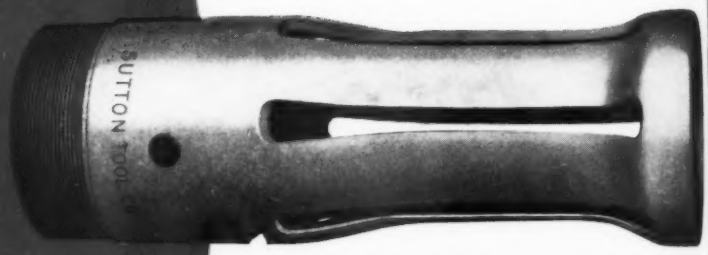
Style "L" Master Feeder—Interchangeable and replaceable pads seated in recess, with lug engaging a slot in the master to keep pads from rotating. No pins or screws. Style "L" handles stock practically up to machine capacity.

3 best friends of an automatic bar machine

Super Cage-type Feeder — Advantageous for short runs. Tension easily adjusted simply by tapping with hammer, since multiple grips act as springs. Handles round, hexagon or square stock. Available in non-marring bronze.



Conventional Solid Feeder — Manufactured according to the dimensional specifications of Machine Tool Builders. Made from specially selected steels and given proper heat-treatment to provide better gripping and maximum tension for the life of the feeder.

These three feeders are the old reliables! 90% of all bar machine operations are performed with them! That's why it's important to use Sutton feeders. Sutton specializes in these three types—steel to exacting requirements, uniformity of tension, immediate deliveries from stock.

Sutton supplies a variety of feeders for specialized types of work; odd shapes for special extruded stock, combination feeders and feeder tubes for over-size stock. Call on Sutton for designing, engineering and manufacturing!

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CIRCLE INFORM-A-GRAM KEY NO. 2

TOOLING & PRODUCTION Magazine

VOL. XXVI, No. 6

SEPTEMBER 1960

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BPA

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SEPTEMBER 1960
VOL. XXVI, No. 6
GEORGE J. HUEBNER, Founder
1885 - 1956

personally speaking...

Dear T & P Reader:

Sooner or later, in this country, we get around to publicly airing everything that has any import to our population. Advertising has been coming in for its share of conversation in government circles, among customers of designers and vendors of advertising, and among advertising people themselves.

I'm not going to argue the issues. I will have to admit that some advertising, to say the least, is repulsive and in bad taste. But that's a reflection of the people who prepare such advertising. If we knew them, we probably would consider them to be repulsive, also. On the other hand, advertising as an activity or a technique, has achieved tremendous good for this nation of ours. I'd like to define basically what advertising is, because if you have not lately reviewed this I'm sure when you reflect on it you will agree that it is of great importance to you, personally.

Advertising, essentially and primarily, is the communicating of ideas. It is an informational service and all you have to do to quickly appreciate this is to run through the pages of this magazine. After you've done so, mentally tabulate what you discover. I'm sure you will find many things that you will file back in your subconscious with the thought that they may be important to you some day. And you'll also find mention of some products or methods that you can apply today or in the near future to improve your company's operation.

I think this is true advertising, — purposeful, and intent upon contributing to the well-being of our beloved nation.

We and other publishers do many things to evaluate the effectiveness of our publications. We use several independent services to get from you or others like you among our readers, opinions concerning the many facets of our publication. These guide us daily.

Before concluding, I'd like to make a couple of points concerning how you can help us, and all publishers, to help you. When you are called upon to do so, please give us your considered opinions without stint if it is at all possible for you to do so. And also, when you have occasion to communicate with a vendor as a result of seeing an advertisement of his, by all means tell him just that. And if you feel like going a step further, tell him where you saw his ad. Or, if it was heard instead of seen, tell him that. If you do, you'll contribute greatly toward keeping up a flow of information that is valuable and important to you.

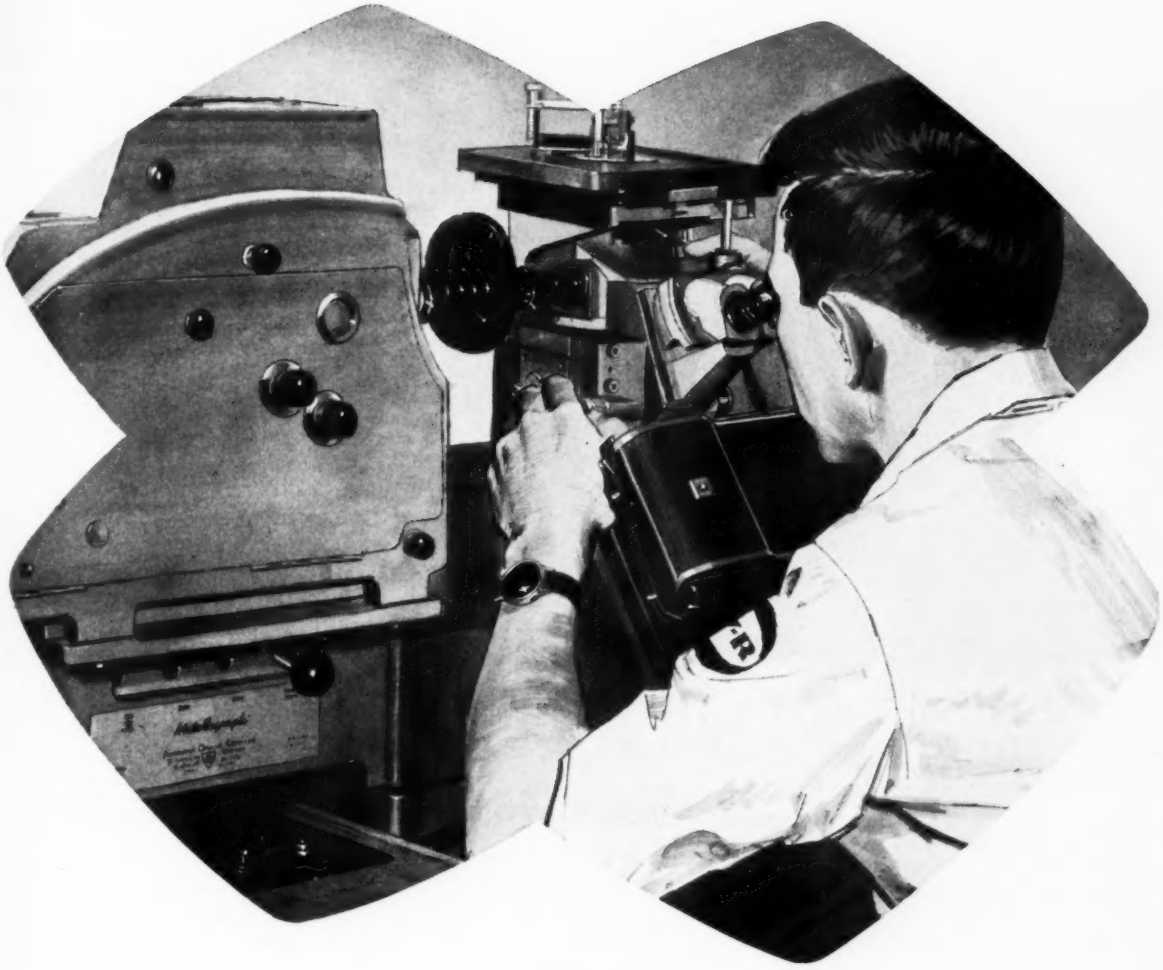
Cordially yours,

Ray Huebner

Publisher

V-R

CREATING THE METALS THAT SHAPE THE FUTURE



Constant Checking Assures Carbide Consistency

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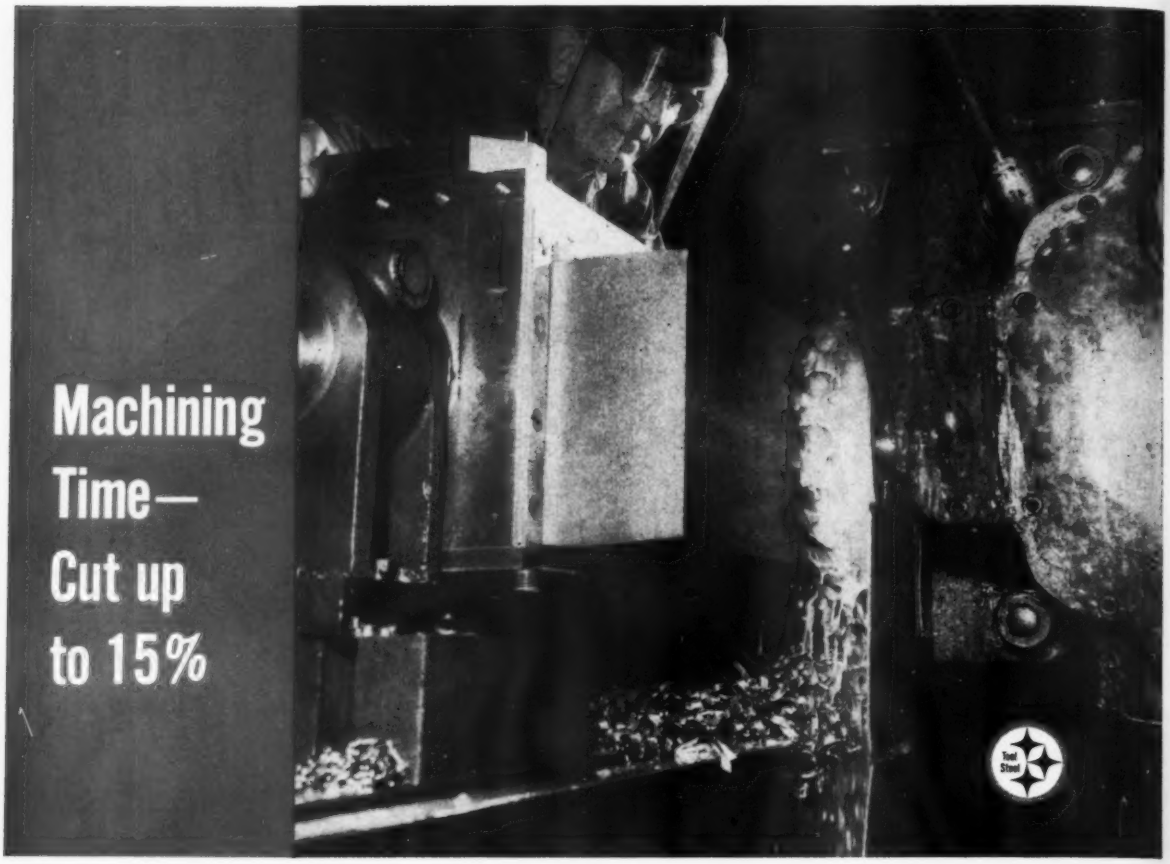

Dependable DESEGATIZED® FM Die Steels

. . . easier to work . . . easier to machine

In the production of thousands of metalworking dies, the properly dispersed alloy sulphides in Latrobe's FM High Alloy Die Steels have permitted increased feeds and speeds—*machining time cut up to 15% in most cases!* This cost-saving production is possible with no sacrifice of the excellent toughness, wear resistance and hardenability properties of the steel.

FM die steels are produced by Latrobe's Desegatized process of manufacture. This process guarantees full structural uniformity of the steel—an even distribution of the all-important carbide particles and "free-machining" alloy sulphides—your assurance of dependable quality.

Four grades of 12% chromium FM steels are regularly stocked: Olympic FM (type D-2) for long-run applications; BR-4 FM (type D-7) for extreme abrasion resistance; GSN FM (type D-3) for severe non-deforming requirements; Cobalt Chrome FM (type D-5) for extra resistance to galling and pickup.

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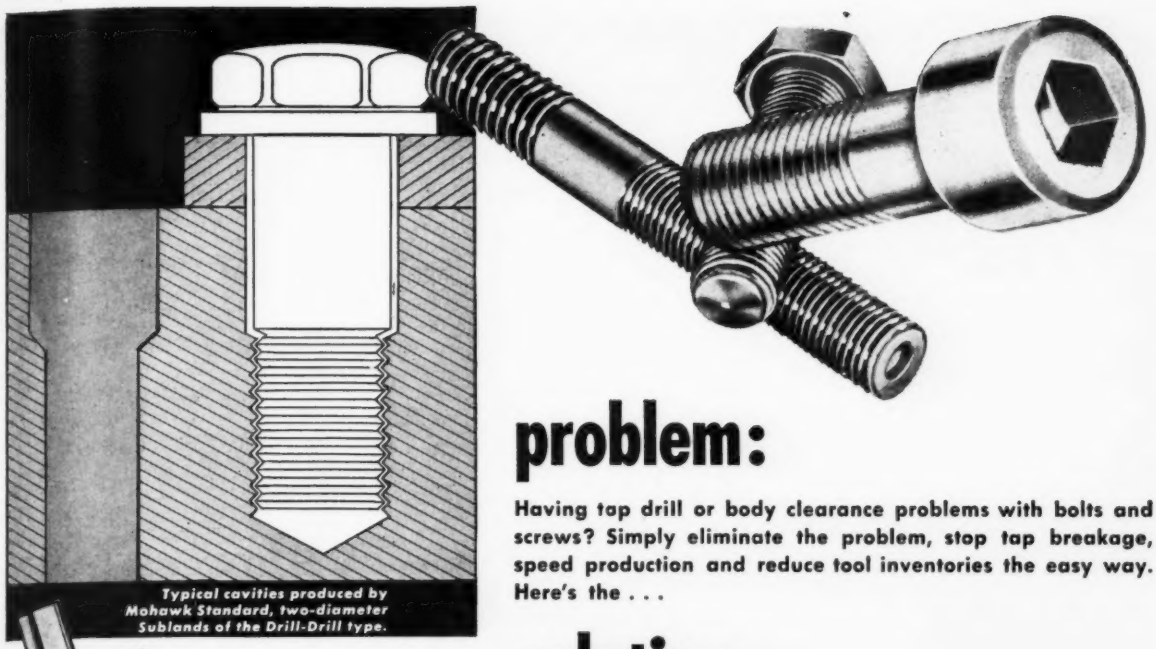

Typical cavities produced by Mohawk Standard, two-diameter Sublands of the Drill-Drill type.

problem:

Having tap drill or body clearance problems with bolts and screws? Simply eliminate the problem, stop tap breakage, speed production and reduce tool inventories the easy way. Here's the . . .

solution:

MOHAWK STANDARD SUBLAND DRILLS

Mohawk Standard Sublands of the Drill-Drill type will produce clean, concentric, burrless holes in *one* simple operation. Thus, you automatically eliminate extra jigs, fixtures, tap breakage and poorly fitted parts. And, a Mohawk Standard will out-perform and outlast dozens of ordinary tools because they stay accurate through regrinds...right down to the shank! You get more holes per hour at lower cost per hole than ever before. Mohawk Standards are the time-proved solution for more efficient, cost-saving drilling operations.

MOHAWK STANDARDS are immediately available from factory and local stocks in three basic types: Subland Drill Chamfer, Subland Drill-Counterbore and Subland Drill-Drill. In all practical sizes, three standard step lengths and three shank styles.

Subland Drill-Chamfer

Subland Drill-Counterbore

Write Today **for your free copy of the new Mohawk Standard Catalog. Complete with detailed illustrations and specifications on the full line of cost-saving Standard Subland Drills.**

world's largest producer of Sublands

Mohawk
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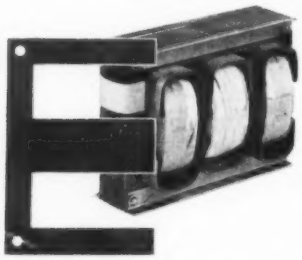
Montpelier, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 7

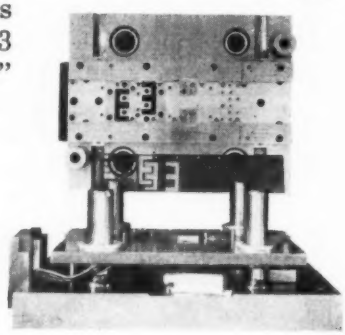
Cleveland Tool and Die
CASE FILE

"12 to 15 times longer die life"

CTD PRECISION CARBIDE DIES SPEED OUTPUT OF "FRANCEFORMER" LAMINATIONS



Check the transformer on the next neon sign you see, and chances are it'll read "Franceformer"—trade mark of the France Mfg. Co. of Cleveland, O. This aggressive company supplies leading jobbers of neon signs throughout the country. For high-speed lamination production, France chooses CTD precision tungsten carbide dies. "CTD dies give us continuous production with far less downtime", says Emil Olds, plant manager. "We get 12 to 15 times the die life at only 3 times the previous cost."



Another example of the important production efficiency made possible by CTD precision craftsmanship

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CIRCLE INFORM-A-GRAM KEY NO. 8

Talk of the Month

Getting the Breaks In Engineering

by Stephen A. Derry, P.E.

Mr. Derry, president of The Derry Engineers, Louisville, Ky., presented the talk from which this article is excerpted before the first National Inventions & New Products Conference at the Cleveland Engineering & Scientific Center.

"BREAKS" IN ENGINEERING are left untouched by the thousands for each revolution the second hand completes on your wrist watch. Why? Because many engineers have failed to train their ears to hear opportunity knocking.

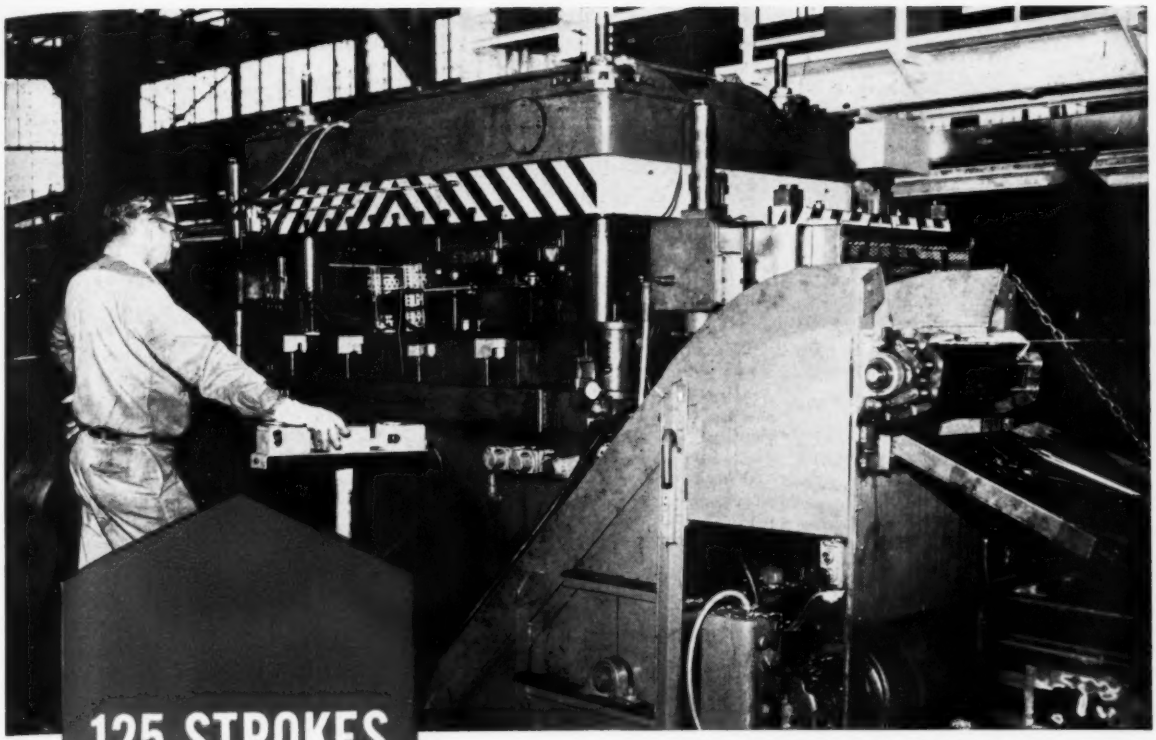
When opportunity knocks one must be prepared to accept it. The world's most successful men and women unconditionally admit that the breaks they received made up the difference between success, failure, and mediocrity.

It is an established fact that all successful people constantly make a definite play for breaks. They have mastered the art of recognizing a break. They have acquired the know-how of taking advantage of each break. They have achieved the skill to channel a break to themselves. These successful people have paved the way for you to become a member of this elite "fortuna society."

Where are the breaks? This is not as difficult as it sounds. Statistically the probability of an existence of a break in engineering is 100% in your favor. For example:

From the following established basic data, you can quantitatively determine the numerical existence of breaks in engineering. It is a known fact that demographers,

. . . Continued on page 10



This Henry & Wright Double Crank Dieing Machine has been in constant use for three years with negligible maintenance costs. It is used on a wide variety of jobs with almost daily die changes.

125 STROKES PER MINUTE on a 300 TON PRESS with a 6″ STROKE

This is a lot of strokes per minute for a 300-ton automatic press especially on a part requiring a 6″ stroke. This is one of the reasons why The Budd Company, Philadelphia, chose high production Henry & Wright Dieing Machines. They also needed flexibility for a wide range of short-run jobs; accurate die guiding to assure minimum wear on expensive, multi-stage progressive dies averaging 8-stages each; automatic material feeding and parts ejection; quick and easy die changing . . . all so necessary to stay profitable in the highly competitive stamping business.

You'll find Henry & Wright machines will meet every production requirement. The 6″ stroke, high tonnage job described in the headline is a severe test for any heavy automatic press. If you need more production, at competitive costs, for a variety of jobs, ask now about the high production Henry & Wright machines. Your inquiry will receive our prompt attention. Sizes from 25 to 500-ton capacity.

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MODERN MACHINE TOOLS = PRODUCTION EFFICIENCY

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HPM

H41

CIRCLE INFORM-A-GRAM KEY NO. 9

. . . **Month's Talk from page 8**

using statistical methods, can and do make accurate predictions. Today, in America, we have 180-million people, of which 60-million are under 18 yrs old and 15-million are over 65. This statistical population is undergoing constant change in your favor as far as breaks in engineering are concerned.

To focus your attention closer to the real fact how this constant is actually working for you, it might help if you knew that it is an established fact that today eight babies are being born in the U.S. every minute, round the clock. Projecting this birth rate fact coupled with death rate fact to world wide rate, we find that the present world wide rate is 47-million more births than deaths which will take place in 1960. By 1970 this rate will exceed 58-million more births than deaths.

Armed with this statistical fact, you can readily understand why growth in population stimulates many thousands of new opportunities in engineering. This continued acceleration in growth each year will require new services, new products, new techniques, new industries, new concepts of living, and hosts of additional opportunities for engineers.

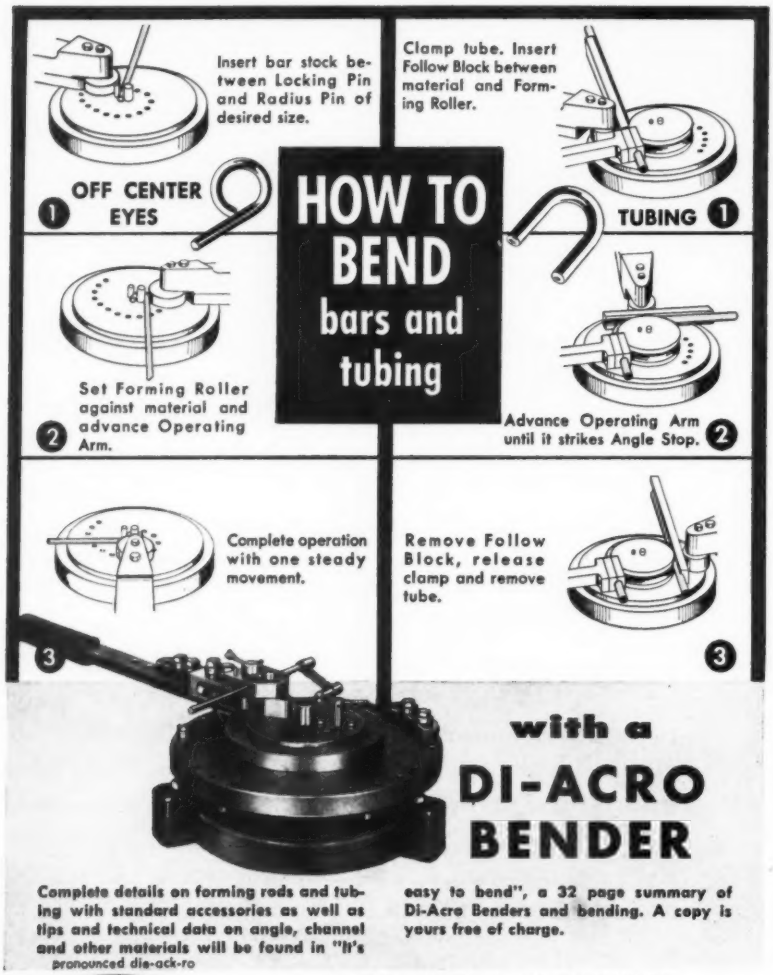
Collectively, all of these changes, improvements, and advancements foster opportunities for many million of energetic and resourceful people. These factors make today's machines, and devices of yesteryears, obsolete. Nearly all of them will eventually be improved, replaced, and/or supplemented with new inventions.

Take the automobile engine as an example. Nearly 80% of the power in gasoline is discharged through the exhaust system and never utilized as an energy producing factor. Similar comparisons of energy wastes could be made about our current-day airplane engines, diesel engines, electric motors, washing machines, refrigerators, air-conditioners, and a host of other machines and devices. The need for better, simpler, and less wasteful articles — less wasteful not only in energy, but of human time and human labor — is upon us and if something is not done soon, it could have serious consequences in America's future in many ways.

The way each individual will prepare himself for a break will vary. For this reason, let me cite a hypothetical method. Then you can rearrange these steps to fit your own situation, and in some degree to your own liking or need.

Ambition: One must be possessed with more than an average degree of ambition which promotes the desired atmosphere for seeking a break. The most natural thing for a person to do is to equip himself for the battles of life through education, training, and experience. Once equipped, he should apply these tools in such a way as to promote his success through advancement of his position in life. Equipped with these useful tools, breaks come in peculiar and sometimes most unexpected ways. Ambition attracts people to you.

. . . **Continued on page 12**


HOW TO BEND bars and tubing
Insert bar stock between Locking Pin and Radius Pin of desired size.
OFF CENTER EYES
1
Clamp tube. Insert Follow Block between material and Forming Roller.
TUBING
1
Set Forming Roller against material and advance Operating Arm.
2
Advance Operating Arm until it strikes Angle Stop.
2
Complete operation with one steady movement.
3
Remove Follow Block, release clamp and remove tube.
3

with a

DI-ACRO BENDER

Complete details on forming rods and tubing with standard accessories as well as tips and technical data on angle, channel and other materials will be found in "It's easy to bend", a 32 page summary of Di-Acro Benders and bending. A copy is yours free of charge.

pronounced die-ack-ro

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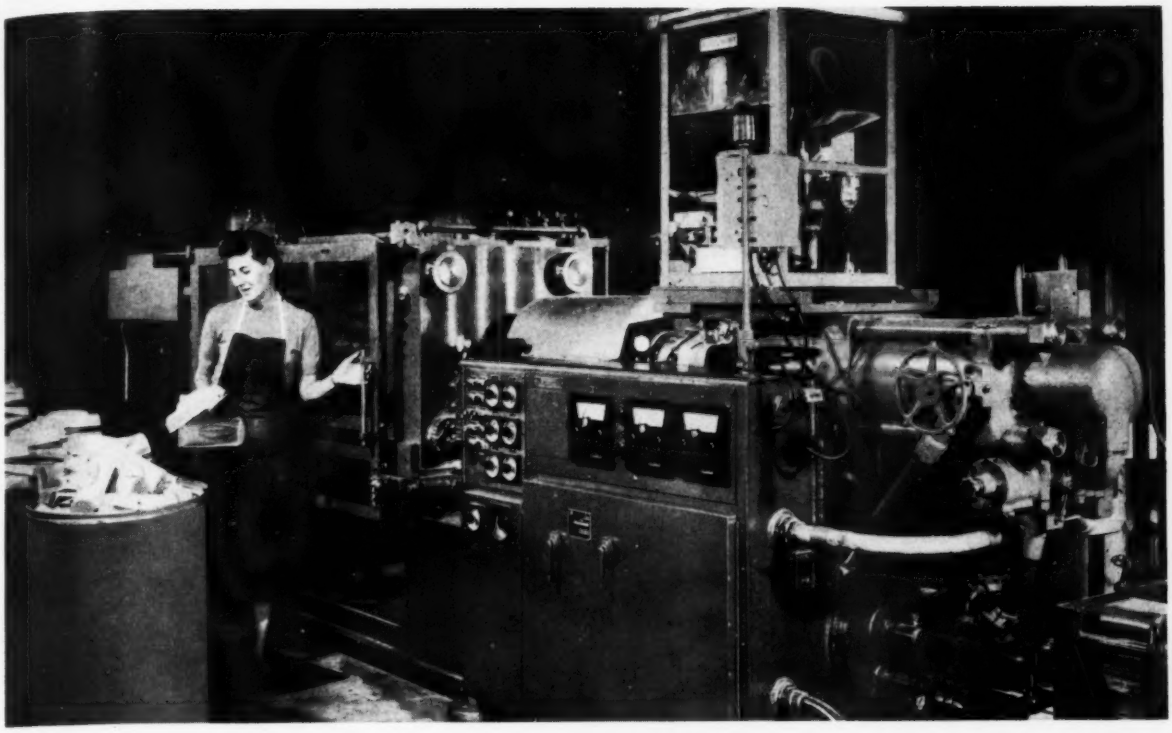

BISSELL IS THE HOME OF SIX FELLOWS NO. 12-350 MACHINES . . .

In the new Bissell plant, the functional beauty of the exterior is matched by the efficiency of the production equipment inside.

In the manufacture of its high-quality line of home-cleaning equipment, Bissell, Inc., Grand Rapids, Michigan relies on six Fellows No. 12-350 injection molding machines to produce difficult-to-mold parts at high production rates.

The fully-automatic Fellows No. 12-350 machine, with all controls grouped for easy reading, dry cycles at 600-800 per hour.

Its standard Pre-Pac device double-strokes the plunger during press dwell, permitting shots up to 20 ounces (33 cubic inches).

The Fellows No. 12-350 machine is easy to set up, and requires so little supervision that one operator can often handle three or more machines at the same time.

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Fellows injection molding equipment

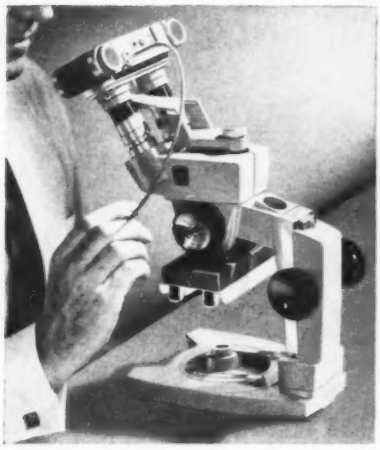
CIRCLE INFORM-A-GRAM KEY NO. 11

AO Offers Low-Cost Stereophotomicrography

. . . in just three easy steps

1 SET the focusing adjustment on your AO Spencer Cycloptic Stereoscopic Microscope, to bring specimen into sharp focus. Camera is mounted directly to Cycloptic...out of the way...ready for instant use.

2 SWING the mounted 35 mm Graflex Stereocamera into position over eyepieces. Designed exclusively for Cycloptic, special compensating prisms in adapter unit render camera parfocal with microscopes' optical system. Set camera for bulb exposure. No further adjustment is necessary.



3 SNAP shutter with cable release. You photograph the sharp three-dimensional image exactly as you saw it. Your film processor will supply stereo mounted photographs. Now you have permanent, three-dimensional photomicrographs, in black-and-white or color, for future reference.

The full-size Graflex Stereoviewer, with built-in light source, completes this easy-to-use 3-D photo package. You can review your findings over and over again...anytime ...anywhere. Here is everything you need for three-dimensional photomicrography... unique...easy-to-use. Available only from American Optical.

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Address_____

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CIRCLE INFORM-A-GRAM KEY NO. 12

. . . Month's Talk from page 10

The more people that know of your ambition, the more likely will your ambition come to reality. This is logical and it does make sense. Try it and find out for yourself — you will find that it works wonders — sometimes overnight. Make your ambition known to as many people as possible — it will pay dividends for you in more ways than you can imagine.

Observation: One must be possessed with a keen sense of observation. One intelligent observation, followed through, can bring success overnight. Never underestimate the power of observation. It is one of the most valuable techniques that man can acquire.

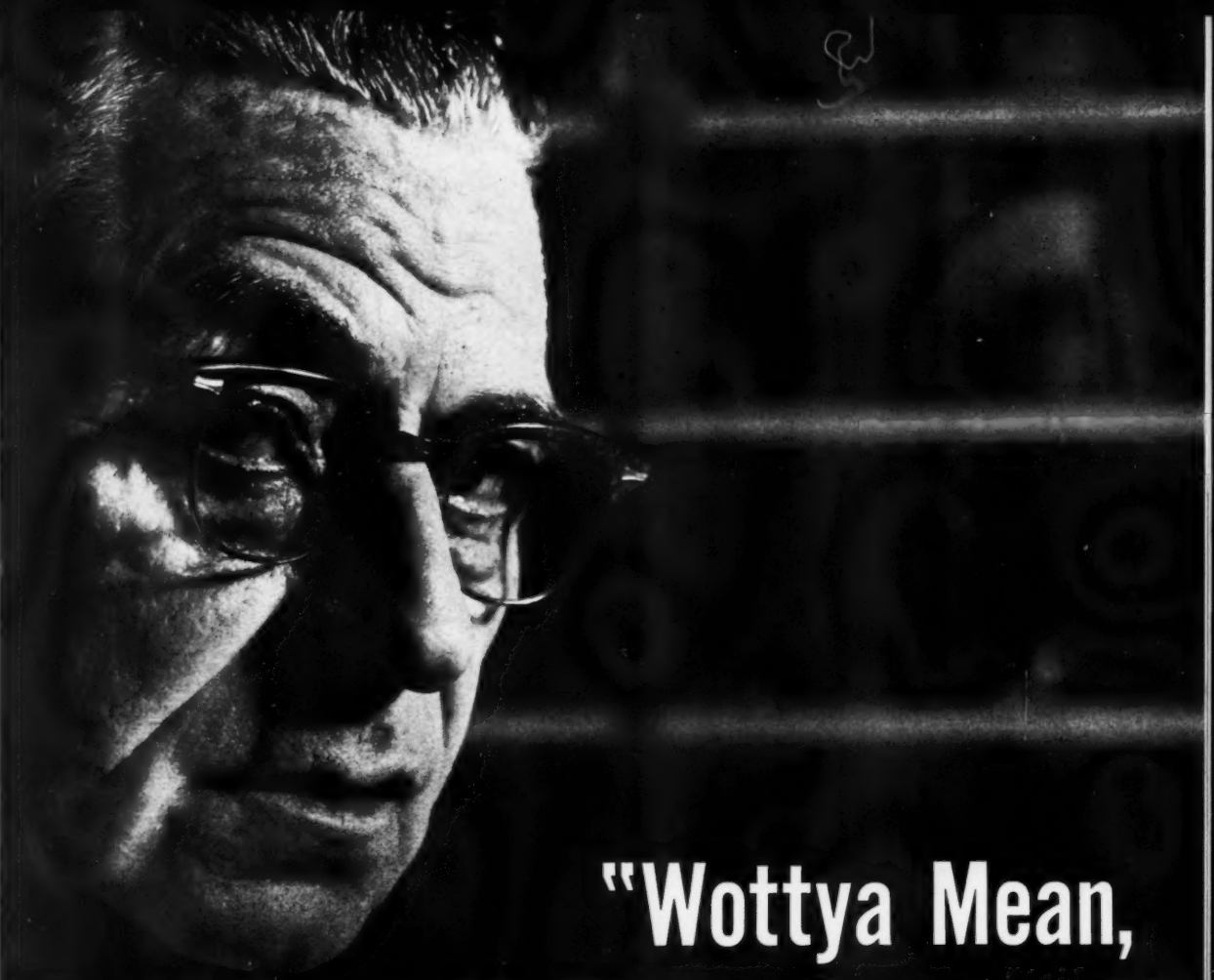
Channelization: When one pursues the art of channeling breaks to himself, that will promote success. He must first learn how to be curious and observant. He uses these techniques in playing for the breaks. Consequently, these tools help to channel a break to his advantage. If you are to profit from any break, it is up to you to help make that break today, for tomorrow may never come.

Presupposition: It will pay you to be possessed with a presupposition or "faith in yourself."

Getting ahead in engineering today requires courage, perseverance, talent, ability, ingenuity, originality, and effort. Breaks never come to those inhibited by an inferiority complex. You are kidding nobody but yourself to believe that a break will come to you when you feel that you do not have the power and the ability to utilize the break to your advantage. Obstacles only become greater when attacked with defeatism philosophy.

Recognition (Intuition): One must train himself to be a recognizer. I think all of us present here this morning can look back and see where we have passed up opportunities. Analyzing your own background, you can probably point to several excellent opportunities where you missed the boat and passed up a few outstanding opportunities for the very reason that you had not, as yet, acquired the knack of how to be an accurate "recognizor."

. . . Continued on page 17



"Wottya Mean, I Don't Need All These Punches?"

That's right! Because product engineering has had no basis for standardization, you have to stock, make or buy replacement punches and dies for no less than a multitude of hole sizes. Die builders have had no practical standard punches and dies readily available at low cost. They have not been able to use the tolerances allowed so that punch size specification was decided by rules of thumb. A.S.T.M.E. standards have gone a long way toward simplifying punch and die specification, but this still left great latitudes with respect to point sizes.

Now, a revolutionary concept called **P**roven **U**sage **P**unch **S**izes (**P.U.P.S.**) has been developed by Dayton Perforators, Inc. **P**roven **U**sage **P**unch **S**izes simplify your specifications, your dies and your products, because 8 out of 10 times they make all the holes you need! And, the most important point, Dayton's **P.U.P.S.** are being **shelf stocked** from coast to coast.

Write Dayton Perforators, today, for full details on how you can get low first cost and immediate punch replacement right off the shelf, improve production with quality tools, and cut replacement costs, downtime and inventory with **P**roven **U**sage **P**unch **S**izes.

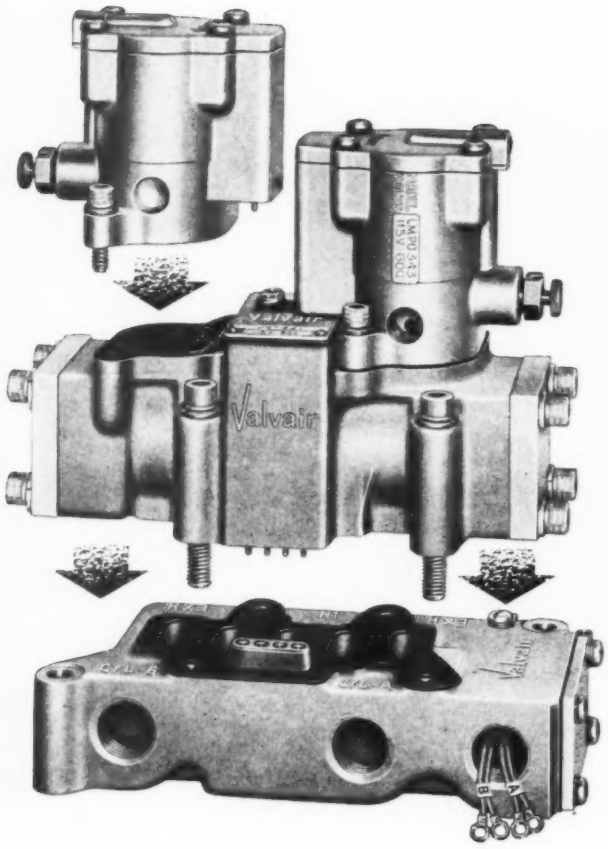
Dayton Perforators Inc.

precision tools for production piercing

PUNCHES
INSERT DIES
GUIDE BUSHINGS

1336 STANLEY AVENUE • DAYTON 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 13



VALVAIR® ½" NPT PLUG-IN VALVES

MODEL PD-441 shown. 4-way single or double pilot-operated types, for sub-base or manifold mounting. Aluminum and stainless steel components assure multi-million cycle dependability. Interchangeable pilots, with coils guaranteed against burn-out for life of valve, fit any plug-in Speed King. Coils for ac or dc, any voltage . . . 35 — 200 psi range . . . integral junction box . . . optional manual over-ride, common or separate exhaust ports, sub-base connected external pilot supply . . . ¾ in. exhaust ports, ½ or ¾ in. inlet and cylinder ports . . . valve meets JIC standards.

Based on the service-proved design principle of the Speed King ¼ in. plug-in Valvair's ½ - ¾ in. plug-in valve series provides plug-in convenience and versatility to a wider range of control valve applications.

Electrical and pneumatic circuits are completed automatically when valve and pilot are plugged in . . . bolted down. The result — cost-cutting reduction of original installation and maintenance time. All power connections are made permanently in sub-base or manifold . . . there's no need to disturb piping or wiring for quick in-service maintenance.

What's more, advanced design shortens stroke . . . speeds response. Separate coded (4-wire) circuits on double solenoid models meet JIC requirements. Flow area through valve and sub-base equals that of full ½ in. pipe.

Whether your control valve applications are on the drawing board or now in service, it'll pay you to investigate the advantages of Valvair plug-in design. A call to your near-by Valvair field office will bring prompt application engineering recommendations.

For more information, write for Bulletin SPL. Address Dept. TP-960, Bellows-Valvair, Akron 9, Ohio

Bellows-Valvair

The Bellows Co. • Valvair Corp. Akron 9, Ohio

DIVISIONS OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

8098-3

CIRCLE INFORM-A-GRAM KEY NO. 14

Take the Gamble Out of Ring Inspection with Pipe Machinery Hilo Set Plugs

If you're relying on such questionable human yardsticks as "feel and shake" to determine whether or not your thread ring gages (solid or adjustable) are bell mouthed and out of limits, you're gambling recklessly with ring life—and possibly squandering it. Pipe Machinery's new Hilo Plug provides a quick positive method for checking or setting thread ring gages... eliminates entirely any risk or uncertainty. For More Complete Information on Pipe Machinery Hilo Set Plugs, write us on your company letterhead today.

THE PIPE MACHINERY COMPANY
29100 Lakeland Boulevard
Wickliffe, Ohio • Greater Cleveland

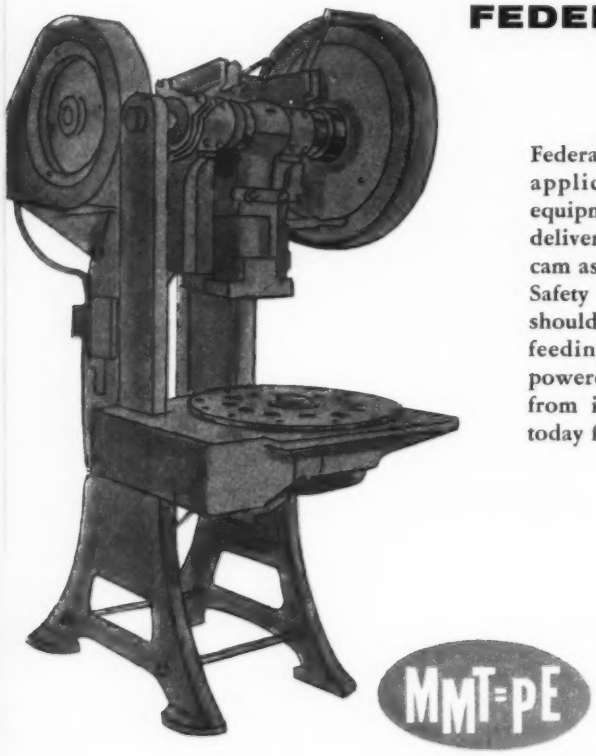
CIRCLE INFORM-A-GRAM KEY NO. 15

Job-tested for supreme accuracy at higher speeds!

VERSATILE—up to 20 multiple stations on hundreds of applications.

ECONOMICAL—eliminates need for specialized, high-priced equipment.

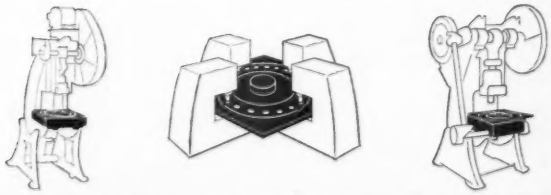
FEDERAL DIAL FEED PRESSES



Federal Dial Feeds deliver the economies of automation—on countless applications—at far lower costs than specialized high-priced equipment. Federals perform up to 20 multiple station operations—deliver up to 300 indexes per minute. Hardened and ground indexing cam assures supreme accuracy and smooth, vibration-free operation. Safety mechanism stops press before die contact, if misalignment should occur for any reason. Can be furnished with automatic parts-feeding and ejecting device. Seven to 125 ton capacities. Dial is powered by gear or chain drive from press crankshaft or directly from independent motor. Check comparison chart below. Write today for new catalog and prices.

FEATURES	FEDERAL	DIAL "A"	DIAL "B"
Anti-friction bearings	Yes	No	No
Meehanite castings	Yes	No	No
Shear pin protection	Yes	Yes	No
Precision without lock pins	Yes	Yes	No
Accuracy guaranteed	Yes	No	No
Checks alignment each index for die protection	Yes	No	No
Low acceleration and deceleration	Yes	No	No
Gear or chain drive	Yes	No	No
Hardened and ground indexing cam	Yes	No	No
Automatic lubrication	Yes	No	No

FEDERAL
dial feed
PRESSES



Use Federal Indexing Tables on your present equipment, or independently with air cylinders, drilling and tapping heads, staking presses, drill presses and other tooling.

THE FEDERAL PRESS COMPANY of Elkhart, Indiana, Department 807

CIRCLE INFORM-A-GRAM KEY NO. 16

. . . Month's Talk from page 12

Nine out of ten times a break, is a sudden and/or sharp pronounced change in your daily routine, sometimes it is even a radical happening in your daily chain of events or set of circumstances. You must be self surveillant for these changes.

For one to recognize a break, he must be on the constant alert for change signs. You have to establish your own standard to fit into your daily events. You will know when the signs appear — in the same fashion as when the air changes before a thunderstorm.

Meditation (Reflection): One must be possessed with the art of knowing how to meditate and/or reflect, and to practice the state of tranquility. This process helps the individual to ready himself to seize a break when it strikes. When an engineer plays for a break he generally changes his set of circumstances or existing conditions. He thinks long and earnestly about his situation and about the change he is about to launch. When the routine change hits — the break — he is ready to accept the opportunity. Why? Because he prepared himself through thought process to that stage where he can immediately recognize the break without a quiver or fear or difficulty.

All of you can train yourself to recognize a break the moment it arrives. Your mental ability immediately goes into action and out comes originality. Creative talents pour forth like water from a faucet and your thought process soon converts these united actions into a break to your own personal advantage.

Organization (Association): The importance of this step cannot be overemphasized. How many successful people do you know, who had not aligned themselves with some organization or association. If you want to succeed and get the breaks in whatever line of endeavor, make it your business to choose your association and/or associates. Become part of an association that will help promote your future. It is important to you to share your interests with others; this helps you to properly create a sound plan for whatever you want to do.

. . . Continued on page 19

Automatic flash removal set-up: When part is indexed to flash removal station, drive head pivots this Osborn Master® Wheel brush forward and downward to remove die-cast flash effectively, uniformly. Rate: 600 pieces per hour.

Flash removal time cut in half

. . . with Osborn power brushing

600 pieces per hour . . . automatically—that's the *new rate* for removing flash with Osborn power brushes from this die-cast venturi cluster. Former off-hand methods used by this large manufacturer of automotive carburetors produced only 250 to 300 pieces per hour.

Now, flash removal is incorporated into a special 24-station index machine where Osborn power brushes automatically do the job quickly, effectively. Output is consistent, uniform.

Removing flash from your die-cast parts—especially small, hard-to-handle parts or those with irregular, complex shapes—can be done better, faster and cheaper with Osborn power brushes. In fact, your metal finishing problems of every description—deburring, cleaning, polishing, precision blending—can be solved with advanced Osborn power brushing methods. An **O**sborn **B**rushing **A**nalysis—made in your plant now at no cost or obligation—is the first-step toward improved, less costly production. For details, write or phone *The Osborn Manufacturing Company, Department L-6, Cleveland 14, Ohio.* Phone ENdicott 1-1900.

PRODUCTION ENGINEERING SHOW SEPT. 6-15 1960

OSBORN BOOTH 375-377

Osborn Brushes

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes • Foundry Production Machinery

CIRCLE INFORM-A-GRAM KEY NO. 17

UNIVERSAL TOGGLE-ACTION UNI-KLAMP

quick, positive, sturdy

Universal's Toggle-Action Uni-Klamps are engineered to give positive action with a minimum of force required for locking or unlocking. They're the fastest and most economical work-holding devices yet designed and they incorporate features recommended by independent tool designers, process engineers, tool makers and machinists. With clamp pressures available from 200 to 1200 lbs., there's a Universal Uni-Klamp in a size and type to suit your requirements. Write for catalog showing complete line.

TOGGLE LATCH TYPE CLAMPS

PUSH-PULL CLAMPS

PORTABLE CLAMPS

AIR OPERATED CLAMPS

UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 8, MICH.

218

CIRCLE INFORM-A-GRAM KEY NO. 18

. . . Month's Talk from page 17

How does one make the most out of opportunity? The opportunities which are now in process of unfolding are truly tremendous. Now, complete your preparation to take full advantage of the breaks that lie on the horizon. Taking all other factors into consideration, in all probability the most important asset that you can have in making the most out of an opportunity is to sustain a proper mental attitude.

For our purpose mental attitude may be defined as the affirmative pursuit or, in other words, the positive approach to achieving a goal. When the positive approach is utilized, the chances are great in your favor, that it will earn for you a series of more favorable breaks than you would receive, if you choose to follow the negative approach, in achieving a solution to your problems. Cultivating the proper mental attitude is the most difficult phase in your program — getting the most out of opportunity.

If man wishes to be successful in his profession, he must today seek the knowledge, develop the skill, and perform the duties that make success today.

To escape from these by the path of good intentions for tomorrow does not count. To do this is merely fixing a pattern of escape for his future conduct. Man does tomorrow what he has schooled himself to do today. Life is made up of what man thinks, and says, and does right now.

It is folly for the engineer to depend on serenditipity for his breaks. Those who wait for windfalls to come to their aid will soon find themselves at the bottom of the totem-pole compared with those who are prepared to avail themselves of all breaks.

Up to this point, I have expounded on breaking the barriers of getting breaks in engineering. Now I would like to pass on to you a few thoughts on what one should do once he passes through this barrier. One must:

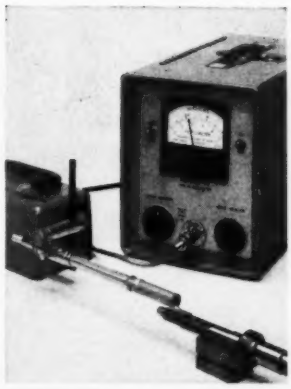
- Win the people to your side. It is your best interest.
- Manage yourself effectively. Improper behavior destroys.

. . . Continued on page 22

Here's the latest inspection equipment

. . . FOR SURFACE MEASUREMENT

PROFILOMETER® — Measures the roughness of practically *all* machined and finished surfaces, internal and external, in microinches (arithmetical or r.m.s. average height). Fast; dependable; easy to use.



PROFICORDER® — Draws magnified profile of internal and external surfaces, showing absolute deviation from flatness or roundness. Chart shows *roughness* only, *waviness* only, or *total profile*, as desired; permits measuring height, width and spacing of waves, bows, steps, roughness and other irregularities.

MICROCORDER® — Draws magnified profile of internal and external surfaces along straight path of trace. Chart shows pits, pores, scratches, chatter marks and similar irregularities in detail.

WAVOMETER® — Measures the microinch height of waviness irregularities (r.m.s. average) around internal and external surfaces of rotation on a production basis.

The Profilometer, Proficorder and Microcorder are used on metals, paper, plastics, ceramics and many other materials.

. . . FOR MEASURING RUNOUT

VAROMETER® — Measures runout of spindles, shafts, wheels etc. while the parts are rotating. Also used for surface analysis.

. . . FOR TESTING BALL BEARINGS

ANDEROMETER® — Measures the characteristics of assembled ball bearings that result in noise and vibration, in production and receiving inspection. Enables bearing users to write *numerical specifications* (in Anderons) for overall quality of ball bearings.

SEE this equipment in operation at Production Engineering Show BOOTH 418-420-422

. . . . or write for literature on items of interest.

MICROMETRICAL MMC MANUFACTURING COMPANY
3621 S. STATE RD. ANN ARBOR 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 19

AT DE VLIEG BOOTH 431 • **NMTBA EXPOSITION**

new series

"Designated the model 'H,' our new Jigmil series provides greater range, is more rugged, easier to operate and more accurate."

"Available in spindle sizes ranging from 3″ to 5″, the new 3H, 4H and 5H machines greatly increase JIGMIL range for precision boring, milling, drilling and other operations. The new series introduces simplified controls, thermal control of main spindle bearings for increased accuracy . . . wider bed and table for added stability and working range . . . stainless steel way covers for positive protection . . . features that reach a new standard in JIGMIL accuracy, ruggedness and simplicity of operation. And like all JIGMILS, the 'H' series is available with the DeVlieg Diatrol direct dial dimensioning system or Tapac* —DeVlieg's own system of automatic tape control."

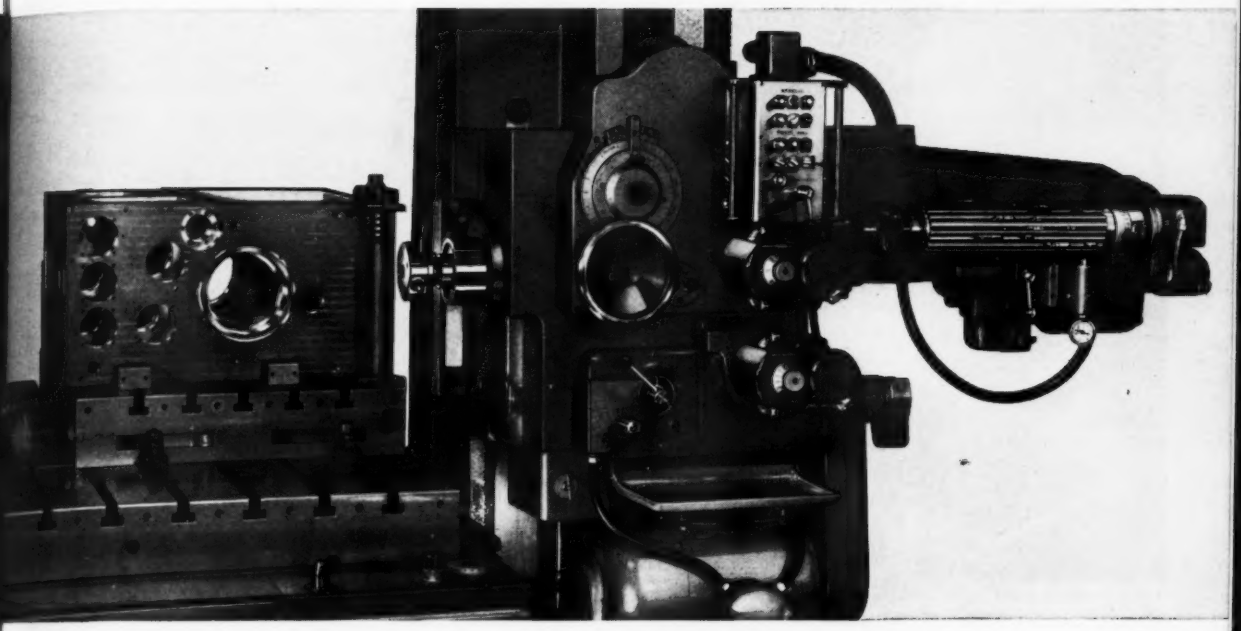
R. A. JERUE
Vice President in Charge of Engineering

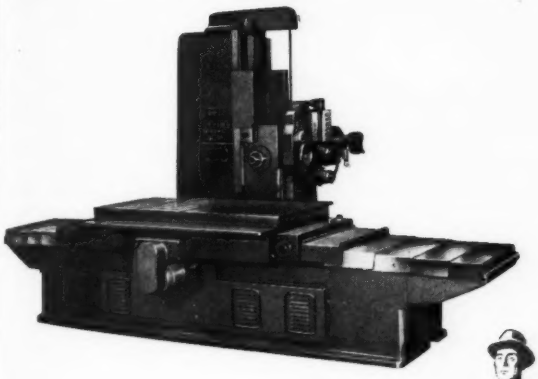
**Tape Automatic Positioning And Control*

DE VLIEG MACHINE COMPANY, FAIR STREET • **ROYAL OAK, MICHIGAN**

"H" Jigmils®

with Duplitrol • Diatrol • Tapac





Rewarding revelations in automatic precision await your next visit to Fair Street

MMT-PE

See new "H" series JIGMILS with DeVlieg Diatrol and DeVlieg Tapac in operation at the NMTBA Exposition, Chicago, September 6-16th.

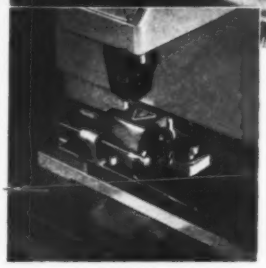
Also, see in operation the new Micropoint Precision Tool Grinder—first grinder capable of absolute control of tool geometry.

DeVlieg

SPIRAMATIC JIGMILS

ACCURATE HOLES AND FLAT SURFACES IN PRECISE LOCATIONS

CIRCLE INFORM-A-GRAM KEY NO. 21



Measure SPECIALS Easily with This New Universal Staging Fixture

Cut set-up problems in measuring small parts, cylindrical pieces, odd shapes. There's a new Universal Staging Fixture to position just about *any* part up to 3 inches in length. Mount the part and see the sharp image on the distortion-free 10-inch screen. Get micrometer readings to .001". So easy unskilled help can learn it in less than half a day. Other big savings, too . . . extremely low purchase price, *plus* almost unlimited versatility. With your choice of understage and surface illumination, and the new Universal Staging Fixtures, you can just about write off special jigs and fixtures as a cost factor.

Find out more about how B&L can simplify your precision inspection. There's a complete line of instruments to help you. Mail the coupon now.

BAUSCH & LOMB INCORPORATED
77309 Bausch St., Rochester 2, N. Y.

Please send literature on:

- ☐ Bench Comparator, D-297
- ☐ Universal Staging Fixture, D-2007
- ☐ Toolmakers' Microscope
- ☐ StereoZoom Microscopes, D-15
- ☐ Scratch Depth Gage, D-2004
- ☐ Optical Aids, D-1059

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ADDRESS .....

CITY ..... ZONE ..... STATE .....

BAUSCH & LOMB

SINCE B&L 1853

CIRCLE INFORM-A-GRAM KEY NO. 22

. . . Month's Talk from page 19

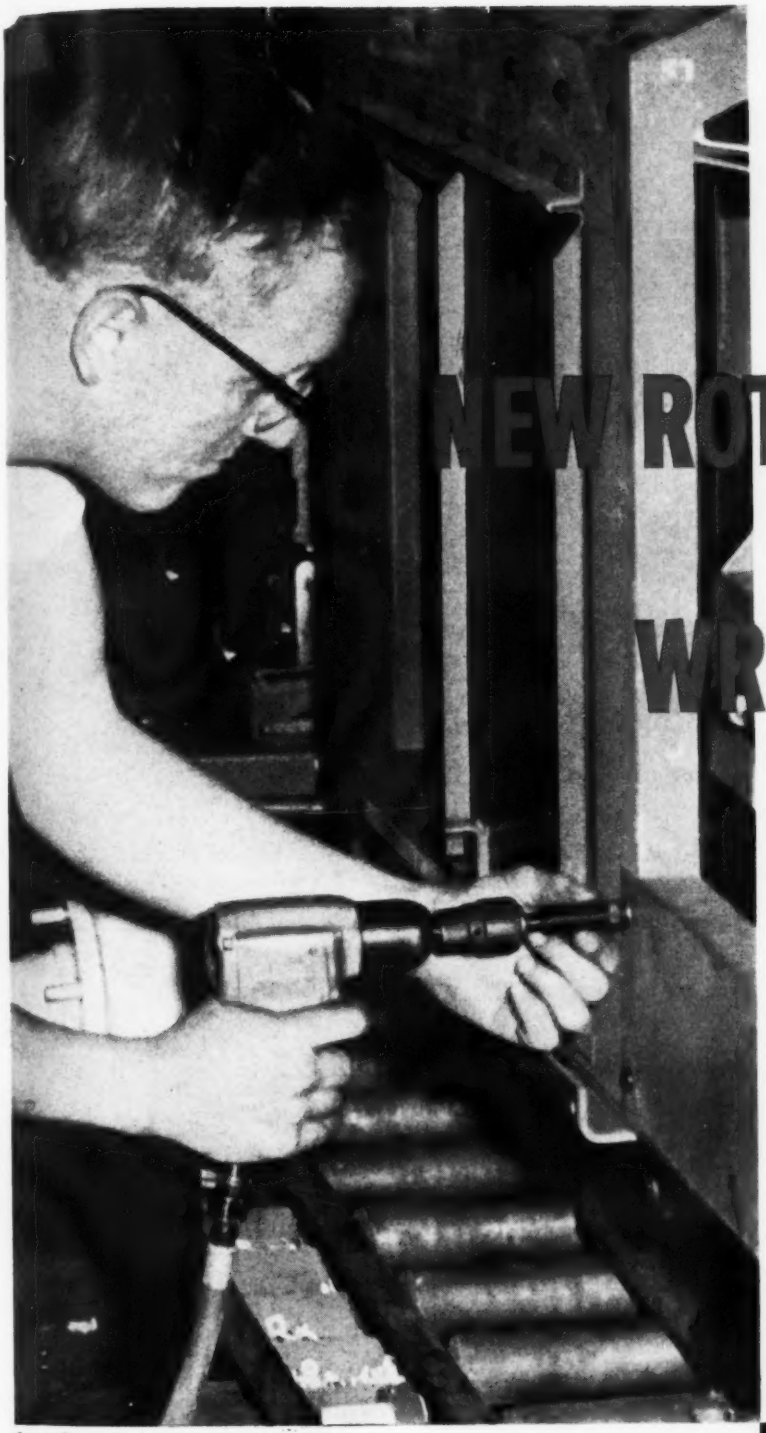
- Speak with authority and force. This creates confidence.
- Write clearly and concisely. This eliminates misunderstandings.
- Perform your work efficiently and effectively. It brings new rewards.
- Think intelligently. It pays to think before you act.
- Make sound and thorough decisions. They are remunerative.
- Keep smiling.

Press Table Dials to Four Separate Jobs

Four different jobs are done on any hydraulic C-press equipped with an index table featuring four separate table dials. To facilitate changeover from one job to another, each dial is equipped with the die blocks and tooling pertinent to a different job. To make a change, the three cap screws which hold the dial are removed and the alternate dial is placed in position. Three dowel pins assure accurate location.

An air valve automatically ejects each part after it has passed the ram station. Another valve directs an air blast through the bottom of the table housing to lift heavier parts vertically before the air stream from the side blows them into an adjacent chute. Both valves are actuated with the down stroke of each ram cycle by adjustable cams mounted on the die crosshead.

The hydraulic C-press and the index table are manufactured by the Hydraulic Press Mfg. Co., a division of Koehring Co.



Courtesy Dayey Compressor Company, Kent, Ohio

Saves 65% of screwdriving time with...

NEW ROTOR J-20S IMPACT WRENCH

JOB: Driving hex nuts and slotted screws attaching covers to portable compressors. Formerly used universal electric tools. Took 20 minutes per cover.

RESULTS: New Rotor J-20S Air-Powered Impact Wrench, with quick-change chuck and combination bit and finder, drives ¼"-20 slotted head screws to attach covers in 7 minutes. Saves 13 minutes per cover. Assures uniform tightness. Reduces operator fatigue.

Ask for a demonstration of the J-20S or other Rotor air tools on *your* job to see how they cut your costs. Write for quotation and literature on the J-20S Impact Wrench.

ROTOR AIR TOOLS: Assembly Tools • Drills • Small Wheel Grinders
Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers
Special Tools • Air Motors
ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders • Polishers • Sanders

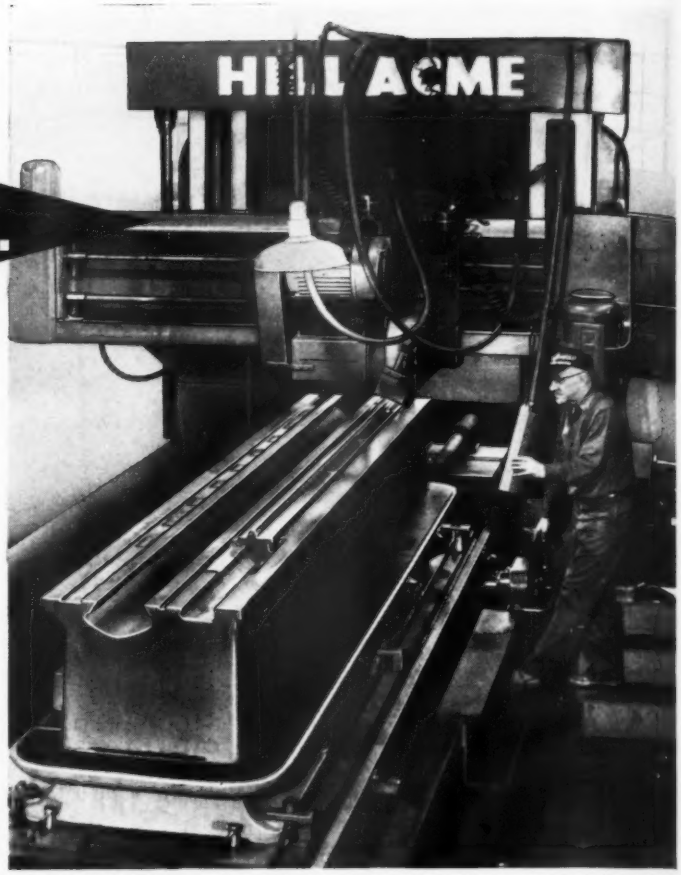
ROTOR TOOLS
The Rotor Tool Company - Cleveland, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 23

Are You Caught...

BETWEEN RISING LABOR COSTS AND CUSTOMER RESISTANCE TO INCREASED PRICES?

A prominent machine tool builder* now saves $1,138.10 in man hours on each spline hobbing machine by using a HILL ACME Surface Grinder to produce flat, parallel ways as compared with their old method of planing and hand scraping: –



Grinding "V" bed ways with a HILL Double Housing Hydraulic Surface Grinder.

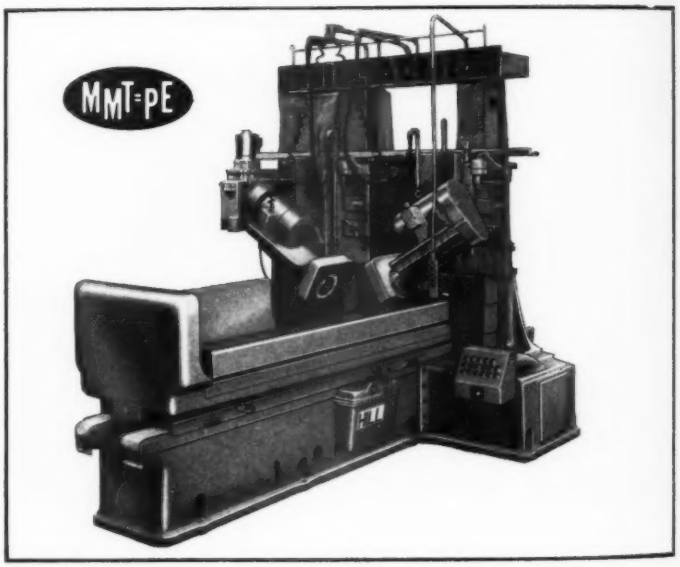
Here is the case history:

ITEM	METHOD	HOURS	RATE	TOTAL LABOR COST
Bed 8'x72"	Scrape	96.0	2.35	$1,014.72
	Grind	22.5	2.79	282.37
				$ 732.35 Savings
Slide	Scrape	12.0	2.35	$ 126.84
	Grind	.8	2.79	10.04
				$ 116.80 Savings
Carriage	Scrape	25.0	2.35	$ 264.25
	Grind	6.0	2.79	75.30
				$ 188.95 Savings
Total man-hour Savings				$1,138.10

The manufacturer reports these additional advantages:

1. A consistency of way accuracy assured.
2. Permits the use of integral hardened ways.
3. Gives a uniform oil film between way surfaces.
4. Improves delivery schedules.
5. A very favorable customer acceptance.

HILL ACME Heavy Duty Hydraulic Surface Grinders are adaptable to a wide variety of stock sizes having flat surfaces. Table widths are 24" to 60". Table lengths vary from 7 to 30 feet. Built in both horizontal spindle and vertical spindle design.



*Builders Name on request

THE HILL ACME COMPANY

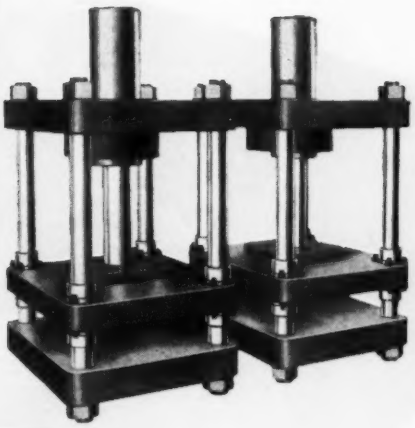
1201 WEST 65th STREET
CLEVELAND 2, OHIO

Manufacturers of: Grinding and Polishing Machines • Hydraulic Surface Grinders • Rotary Scrap Shears • "ACME" Forging • Tapping Machines • "CANTON" Alligator Shears • Bar-Billet Shears • "CLEVELAND" Knives & Shear Blades

We now manufacture, distribute & service the entire line of KLING metal working tools.

CIRCLE INFORM-A-GRAM KEY NO. 24

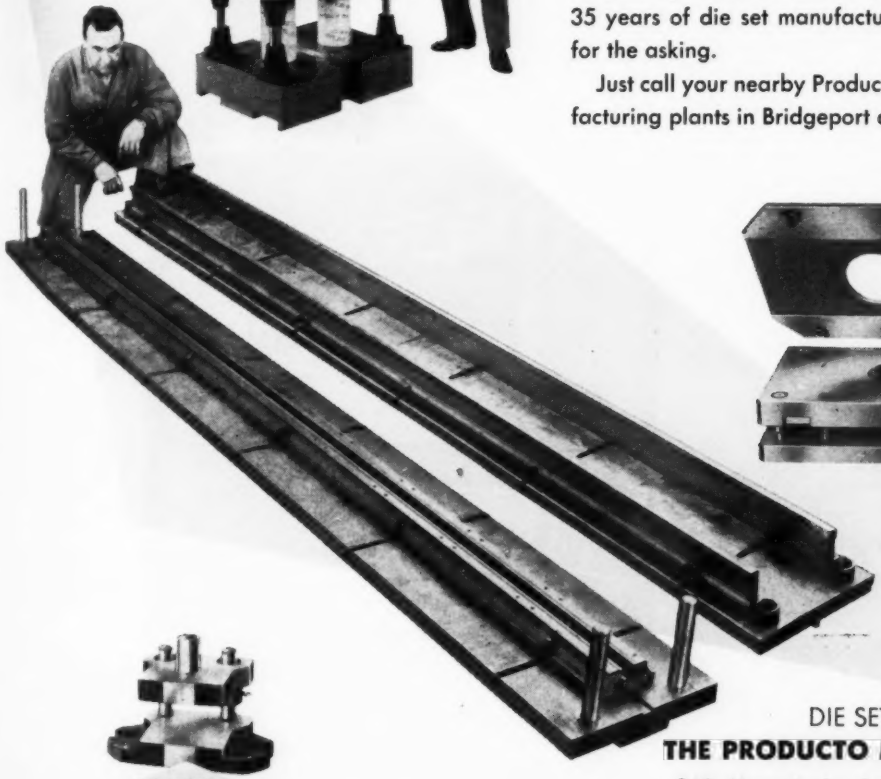
Do you have a special die set problem?

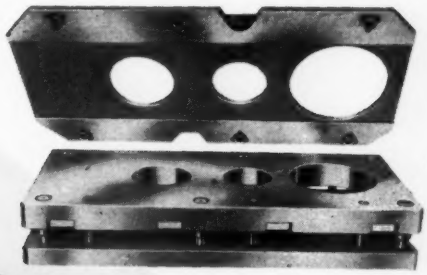


Producto can help you solve it. Special die sets can be large or small—weigh tons or a few pounds; they may be of steel plate, or castings; two-plate or multi-plate.

Often, they can be ordered directly from Producto's catalog. We regularly machine our "catalog specials" to meet your individual requirements. And, when you need a radically different, one-of-a-kind die set—call us. Our 35 years of die set manufacturing experience are yours for the asking.

Just call your nearby Producto distributor, or our manufacturing plants in Bridgeport or Detroit.





PRODUCTO

DIE SET DIVISION
THE PRODUCTO MACHINE COMPANY
945 Housatonic Ave., Bridgeport 1, Conn.

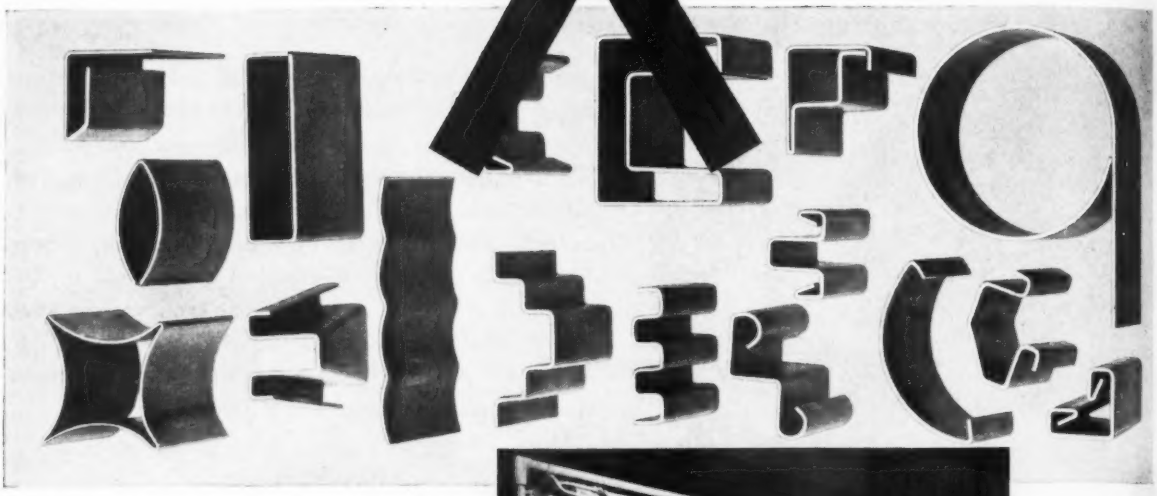
PRODUCTO

DIE SETS & ACCESSORIES · PUNCHES & DIES · TOOLROOM EQUIPMENT

CIRCLE INFORM-A-GRAM KEY NO. 25

SENSATIONAL form-all

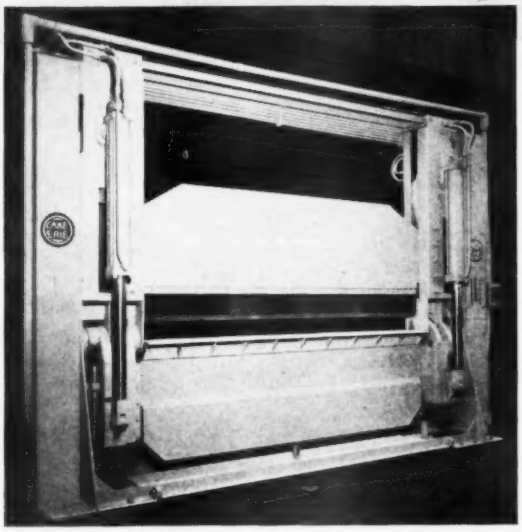
Power models to be first shown at the Machine Tool Exposition



Short sections of typical pieces produced with Form-All.

FORMS SHEET AND PLATE WITHOUT DIES

produces "impossible" one-piece shapes



Hand–Air–Hydraulically Operated Models; capacities from 2 ft. x 16 ga. to 16 ft. x 3/4 in.

LAKE ERIE HYDRAULIC PRESSES

SEE HOW IT WORKS **BOOTH 542**

The Machine Tool Exposition International Amphitheatre

LAKE ERIE *machinery corporation*

706 Woodward Avenue, Buffalo 17, New York

NEW YORK • DETROIT • CHICAGO • LOS ANGELES

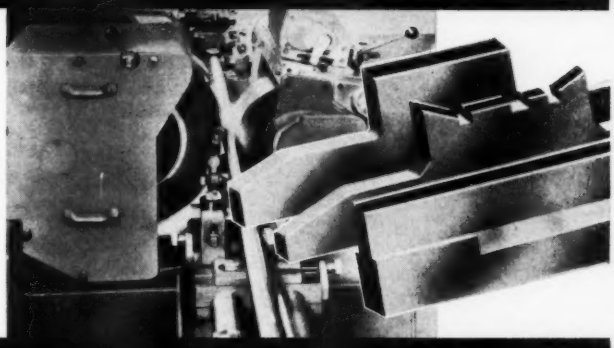
Complete Engineering and Manufacturing Facilities for Designing and Building Highly Specialized Hydraulic Presses

CIRCLE INFORM-A-GRAM KEY NO. 26

. . . THREE TALIDE CASE HISTORIES

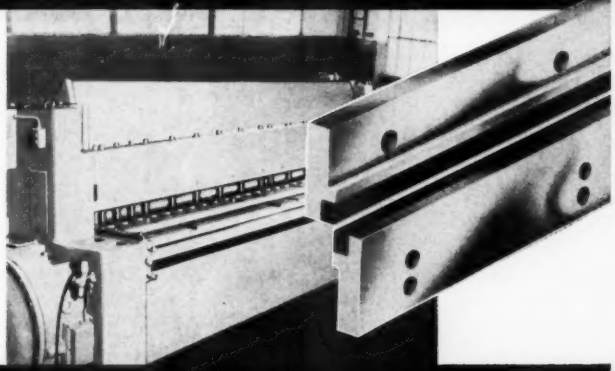
Talide® BLADES for centerless grinding

25 YEARS OF TOP PERFORMANCE using Talide-tipped work support blades on Landis, Cincinnati and Van Norman centerless grinders. Available in lengths up to 120". Tipped with a ONE-PIECE carbide wear strip. No section or seam marks to score or scratch the work. Users prefer blades of Talide superior construction. Over 50 sizes and styles of standard blades are carried in stock. Special blades made promptly to order.



Talide® BLADES for shearing

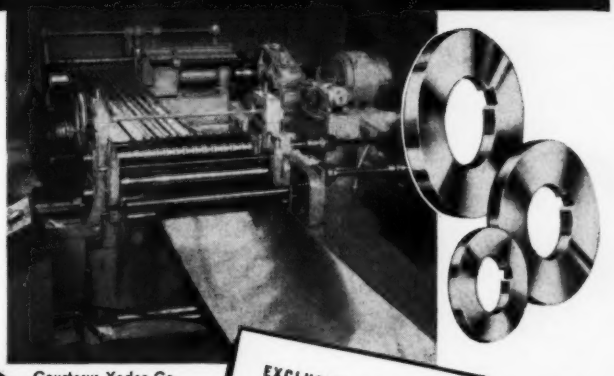
5,631,000 CUTS WITH 59" LONG TALIDE SHEAR BLADES on a Keystone Shear at Westinghouse Electric cutting 29 gauge silicon steel up to 36" wide. 8 months' service life between regrinds saved $2,000 in grinding and set-up time. During this same period it was previously necessary to grind high-carbon, high-chrome blades 24 times — and make frequent replacement. Talide blades normally stay on the job for several years giving high-speed, continuous, burr-free production.



Talide® BLADES for slitting

TALIDE ROTARY KNIVES GIVE PHENOMENAL RUN OF 90 - 1 . . .

A leading strip steel producer of razor blade, high-carbon, spring and stainless steel reports over 1200 coils were gang slitted with Talide knives, compared to 15 coils with steel knives. More tonnage was produced in one regrind of the Talide knives than over the entire life of a set of steel knives. Burr-free, clean-cut edges produced with scrap rate practically eliminated.



Courtesy: Yoder Co.

Write for Catalog 59-G Today!

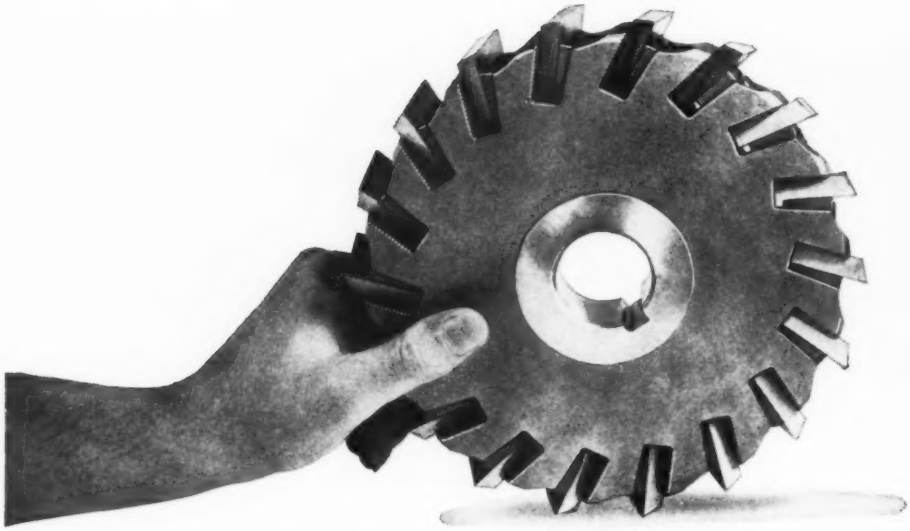
METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

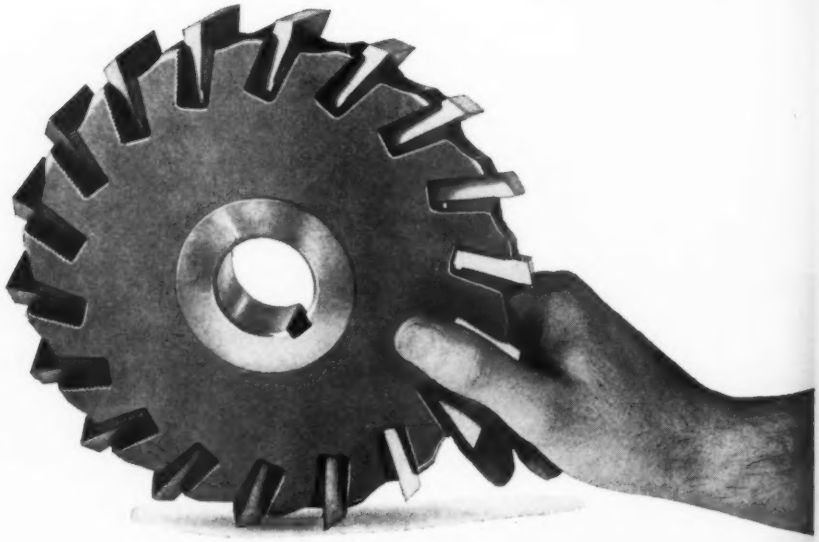
EXCLUSIVE RETIPPING SERVICE

Because of its exclusive hot press method, Metal Carbides is able to re-work worn, chipped-out or broken areas of carbide-tipped blades back to original size and dimension with all breaks and defects eliminated.

CIRCLE INFORM-A-GRAM KEY NO. 27



Which cutter will produce fewer rejects?



LOOK TO INGERSOLL FOR THE ANSWER

You haven't a chance to choose . . . both pictures show the same cutter! You see, there are many factors, other than cutter design, that can affect machining adversely and turn a piece into a reject.

But you do have the chance to prevent trouble by analyzing all factors involved, in advance. Firms that rely on Ingersoll to assist in setting up procedures find the economical answers that hold costly rejects to a minimum or eliminate them entirely.

Let an Ingersoll representative help you with a preliminary survey of your metal removal practices. It will cost you nothing . . . could lead to important savings. Ask a representative to call, or write for the booklet, "Ways to Reduce the Cost of Chips." Address Dept. H-68.

THE INGERSOLL MILLING MACHINE COMPANY CUTTER DIVISION ROCKFORD, ILLINOIS

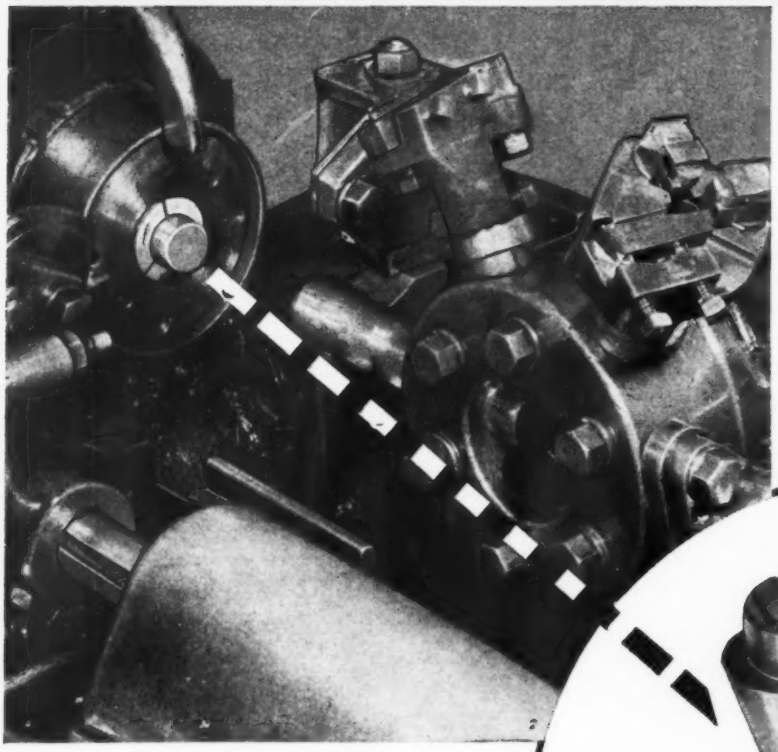
CIRCLE INFORM-A-GRAM KEY NO. 28

MODEL 14-5
The Finest, Most Versatile, 14" Screen Contour Projector Available.
MODEL 14-2A
A Precision Measuring, Bench Model Projector for All-Around Use.
MODEL II
Economical 8" Screen Projector. Can be used in Horizontal or Vertical Position.
EX-CELL-O
CONTOUR PROJECTORS* FIT YOUR
OPTICAL GAGING REQUIREMENTS
MMT-PE
SEE EX-CELL-O'S BOOTH 944
MODEL 30
A True, Heavy Duty Precision Measuring Projector with 30" Diameter Screen, and 12" Diameter Capacity.
MODEL 14-6
with Plain Table for Production-Line Use with Chart-Gages and Fixtures.
MODEL 14-6
with Measuring Table for Production-Line or Limited Tool Room Use.
Write for new edition of EX-CELL-O Contour Projector Booklet—Available Now!
Manufactured by EX-CELL-O Corporation at Detroit, Mich.
SOLD AND SERVICED BY
OPTICAL GAGING PRODUCTS, INC.
26 FORBES STREET ROCHESTER 11, N. Y.
(A subsidiary of EX-CELL-O Corporation)

CIRCLE INFORM-A-GRAM KEY NO. 29

HARDINGE
ELMIRA, N.Y.

PRECISION PRODUCTS
for BROWN & SHARPE machines



COLLETS
FEED FINGERS
PADS

STOCK DELIVERY
FROM

Atlanta, Boston, Chicago, Dayton, Detroit, Elmira, Hartford, Los Angeles, New York, Philadelphia, Seattle, Portland, Minneapolis, Oakland, St. Louis, Springfield, N.J., and Toronto.

Order From **HARDINGE** Today

One Source of Supply Means Purchasing Economy

Write for FREE Bulletin B&S

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 30

A NEW *"COMPACT"* HITS THE MACHINE TOOL FIELD . . .

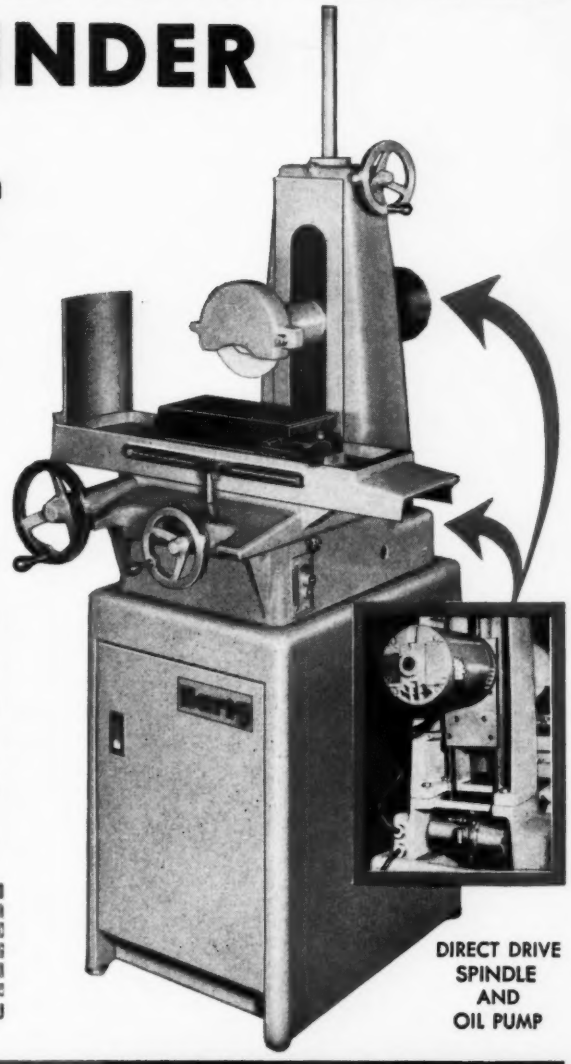
THE NEW HARIG 612 SURFACE GRINDER

with

* **Automatic forced lubrication**
  goes into operation as soon as machine is started — triples life of the ways and preserves original accuracy.
* **Direct drive spindle**
  increases power . . . reduces vibration . . . no V-belts to replace.
* **Your choice of right or left hand longitudinal feed**

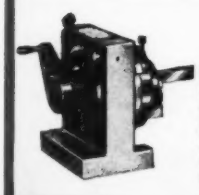
All Standard Equipment

The new 612 represents a break-thru in design and construction whereby Harig now offers industry a low-cost, precision surface grinder loaded with features usually found only on expensive models. Easy to operate . . . requires little maintenance . . . built with the precision quality you expect from Harig.



DIRECT DRIVE SPINDLE AND OIL PUMP

GET ALL THE FACTS . . .
Write for brochure on the Harig 612 Surface Grinder



HARIG'S NEW IMPROVED GRIND-ALL FIXTURE
Easily grinds irregular shaped perforators concentric with shank within ±.0001 accuracy. Also can be used as milling, boring and inspection fixture. NEW ATTACHMENTS: Radius Dresser Arm and Ball Seat Punch Adapter. (Write for new Grind-All Brochure.)

Harig *Manufacturing Corp*

5761 W. HOWARD ST. • CHICAGO 48, ILL.

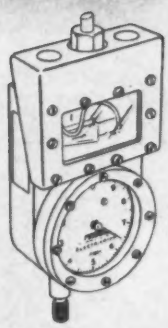
CIRCLE INFORM-A-GRAM KEY NO. 31

Lights show size category. Actual work size is shown on the dial.

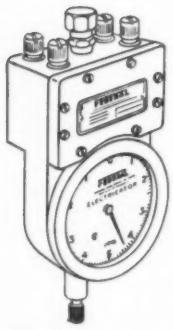
faster gaging . . .

ELECTRIFYING RESULTS . . .

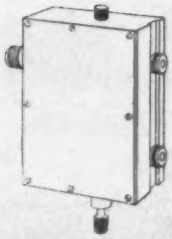
when you use the ELECTRICATOR



WETPROOF STYLE
(For each regular model)



DOUBLE UNIT MODELS
(Four limits, five categories)



ECCENTRICATOR
(For indicating eccentricity, runout, squareness)

There's nothing quite like the Federal Electricator — so easy to apply — so economical — so accurate . . . a Miracle Movement Dial Indicator and two-limit, spindle-actuated switch combined. Use it with tolerance lights in place of your dial indicator for faster, more accurate bench gaging. Use it together with a signal unit for fully automatic inspection or automatic machine or process control.

The Electricator is a high precision unit — switching accuracy is better than 50 millionths on all models. Voltage across the switch is extremely low and switching current is in the order of one milliampere. Therefore, arcing and pitting of contacts is eliminated and accuracy is reliably maintained. The Electricator is calibrated, so it requires only one master.

All Electricator models incorporate the new Federal Miracle Movement which is so wear-resistant . . . so shock resistant . . . you will probably never have to repair or replace it. Six regular models are immediately available from stock. Four different graduations — .0001", .00025", .0005", .001". Prices from $75.

The switching portion of the Electricator is available as a separate unit to operate tolerance lights and/or provide control limits without indicating actual size.

The Federal Eccentricator, a similar type of high precision unit, indicates eccentricity, runout, squareness, etc., *without* being influenced by normal piece-to-piece variations in size.

For more information, write . . .

FEDERAL PRODUCTS CORP.
6239 Eddy Street, Providence 1, R. I.

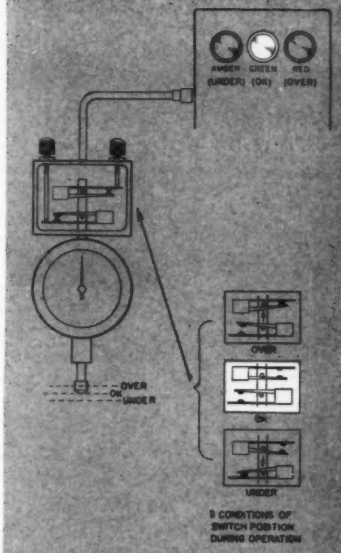
Ask **FEDERAL** *First*

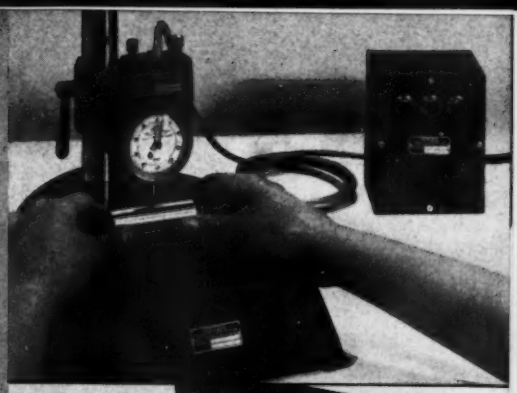
FOR RECOMMENDATIONS IN MODERN GAGES . . .
Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

...R HIGH SPEED BENCH GAGING
...ingle or Multiple Dimensions)

...'s easy to install the Electricator in ...lace of the dial indicator on your pres...t comparator when you need greater ...peed. The Electricator eliminates hav...g to make borderline decisions so you ...et more reliable results . . . and faster ...esults . . . using less skilled help, and ...ith less operator fatigue. Many con...erns have up-graded their manual ...aging this economical way with great ...uccess.

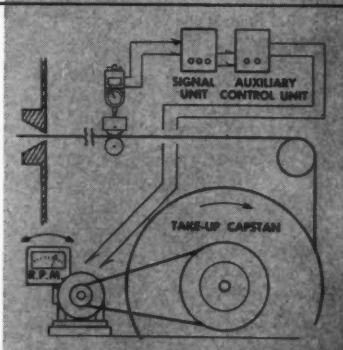
The Electricator offers the most eco...omical way to make multi-dimension ...hecks rapidly and reliably. The signal ...ights on its control panel instantly show ...he operator whether the piece is within ...olerance or not. No need for operator to ...ook at a group of indicators one by one ...n order to determine acceptability.

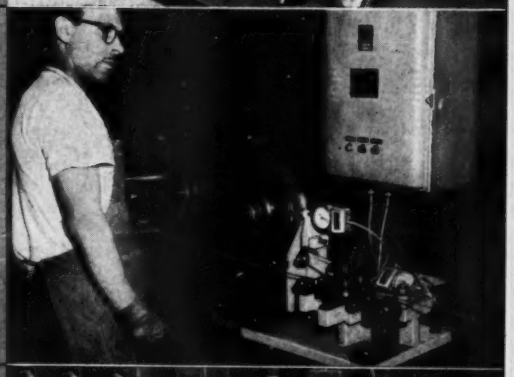




CONTINUOUS PROCESS CONTROL

Because the Electricator is compact, it ...an be installed easily on most continu...ous processes to indicate size trend accu...rately so correction can be made *before* ...crap is produced. In many cases, Elec...tricator, working into appropriate signal ...nit, can be used to *control* size so ...process automatically produces within ...olerance.



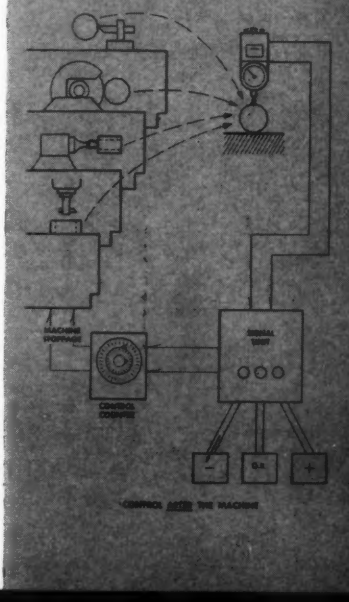


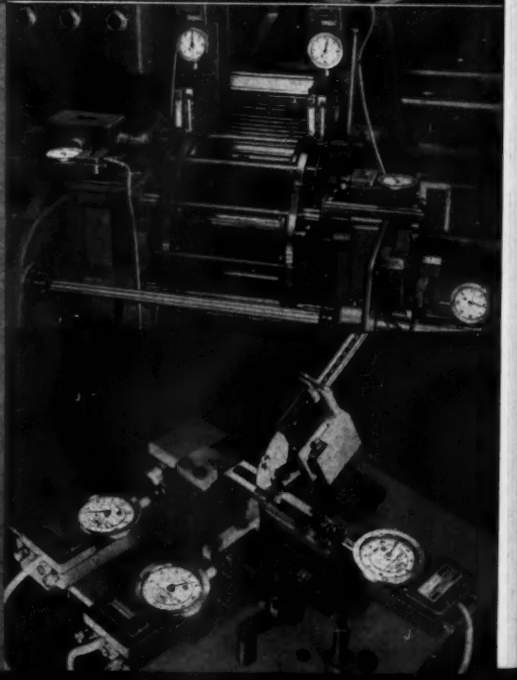
HIGH SPEED AUTOMATIC MULTI-DIMENSION INSPECTION AND MACHINE CONTROL

Electricators have rapid response — can ...gage and sort up to 6,000 pieces per ...our, providing up to 5 sorting cate...gories. Wide range adjustment of limits ...o suit tolerances. Use of low switching ...oltage and current provides high-relia...bility performance.

Electricator can also provide post-process ...achine control in addition to high-...peed gaging and sorting. Using simple ...ontrol counter, gage automatically stops ...achine when tolerance limits are ...xceeded.

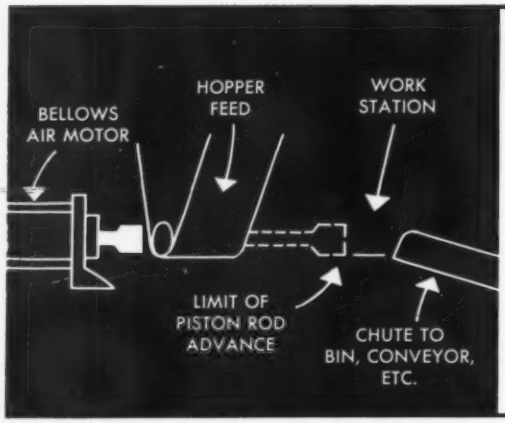
CIRCLE INFORM-A-GRAM KEY NO. 33





ONE OF THESE INEXPENSIVE, SHOP-BUILT WORKFEEDERS CAN SAVE YOU HUNDREDS OF DOLLARS

Shown here are three ways you can use Bellows Air Motors® to feed and position workpieces more quickly, efficiently and at lower cost. They are typical of the many ways Bellows Air Motors are used in all types of industries.

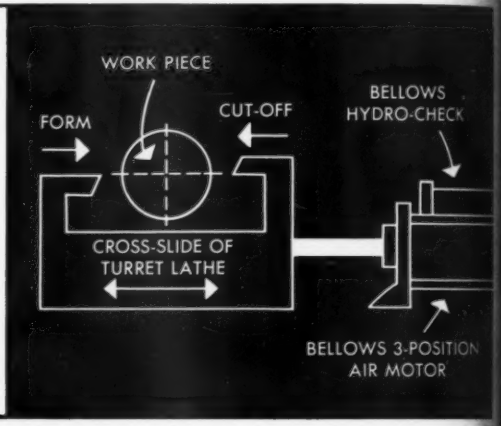


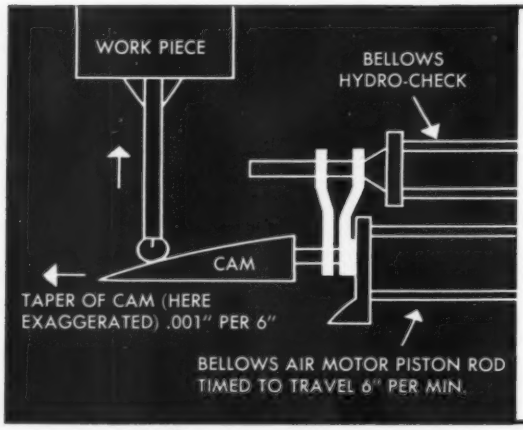
HORIZONTAL, STRAIGHT-LINE POSITIONING AND EJECTING

This extremely simple set-up is widely used in conjunction with hopper feeds in stamping and coining, sawing, drilling, deburring, inspection and similar operations. On its advance stroke, the piston rod of The Bellows Air Motor takes a workpiece from the hopper and moves it until, at full advance, the piece is properly positioned for the operation. The positioning of each workpiece serves to eject the preceding unit. Speed of advance and retract strokes is individually adjustable. The Air Motor can be set for either single cycle or continuous operation, and, when desired, is easily synchronized with a machine element.

FEEDING CROSS-SLIDE OF TURRET LATHE

The sketch at right shows a typical application of a Bellows 3-position Air Motor feeding the cross-slide of a turret lathe. Center, or "neutral," position of Air Motor piston rod is tool "at rest" position. Rod retracts to "form," advances to "cut-off." Using sequencing switches, the Air Motor's operation can be synchronized with the automatic turret to "form" at any point in turret's sequence, return to neutral until all other operations have been performed, then to advance to "cut-off." Speed of advance and retract strokes is independently adjustable. Incorporation of a Bellows Hydro-Check® provides accurate control of piston rod, complete freedom from "chatter."




WORK PIECE
BELLOWS HYDRO-CHECK
CAM
TAPER OF CAM (HERE EXAGGERATED) .001" PER 6"
BELLOWS AIR MOTOR PISTON ROD TIMED TO TRAVEL 6" PER MIN.

SLOW, ACCURATE FEED RATE

Slow and/or highly accurate feed rates—such as might be required by certain grinding and cut-off operations—can be achieved by advancing the work-holding fixture by the action of a roller moving on a tapered cam which is mounted on an Air Motor's piston rod. As shown in the sketch at left, for example, the cam has a taper (greatly exaggerated in the illustration) of .001" per 6" length. If the piston rod is timed to travel 6" per minute, the resulting feed rate of the workpiece is .001" per minute. Compound feed rates can be obtained by appropriate variations in the contour of the cam. Perfect smoothness and accurate control of Air Motor's piston rod is assured by use of a Bellows Hydro-Check.

807-C

THIS SPOT-A-MATION IDEA FILE IS YOURS ON REQUEST

Contains information on a variety of different parts feeders,, as well as installation data, wiring diagrams and equipment lists for scores of other "Controlled-Air-Power" applications. Write for YOUR free file . . . TODAY! Address Dept. TP-960, Bellows-Valvair, Akron 9, Ohio.

Bellows-Valvair

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The Bellows Co. • Valvair Corp. *Akron 9, Ohio*

DIVISIONS OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

CIRCLE INFORM-A-GRAM KEY NO. 34

CIRCLE INFORM-A-GRAM KEY NO. 35

Machine Tool Exposition
Sept. 6-16 Chicago

NIAGARA BOOTH 1330 MMT-PE

a whole press and shear show in itself!

Once again, Niagara has come through with the "newest of the new"! Never before have so many new developments in metal forming and shearing machines been planned into so large an exhibit area. All told, there'll be a "live" show of a dozen machines in operation . . . many engaged in actual production.

From aisle to aisle, here is an action-packed exhibit that will prove especially profitable to press, press brake, and shear users looking for new ways to boost production, improve work quality, and cut costs. Key men from Niagara (yes, top management, too) will be on hand to welcome you and answer questions on-the-spot. Come. Visit Niagara. Allow plenty of time. See all there is to see.

NIAGARA

NOW TURN THE PAGE for a glimpse of what you'll see in Booth 1330

. . . AND they'll all be in action at the Machine Tool Exposition

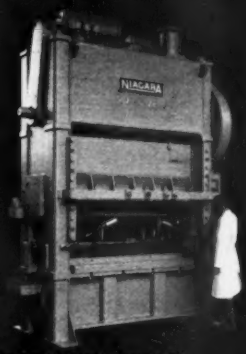
Mech. Sleeve Clutch OBI Press with forming die and demonstration of Niagara Portable Tonmeter.

60-ton Inboard Drive Mech. Press Brake. Will perform several operations with multi-deck forming die.

100-ton Double Crank Straight Side Fully Automatic Press with progressive die. Will be shown in production along with Niagara's Load Monitor.

Underdrive Power Squaring Shear. 10 gage capacity. 96" cutting length.

Sliding Bolster Front-to-Back Crankshaft OBI Press. Will produce giant bottle openers with 2 quick change dies.



150-ton Double Crank Straight Side Press with 9-station transfer feed.

250-ton, 2 pt. suspension, Straight Side Eccentric Geared Press for automation line. Will produce parts with unique Adjustable Draw Die.

150-ton Mech. Press Brake with alternating 2-speed stroke control. Will form bends on long sheets.

45-ton Front-to-Back Crankshaft OBI Press with automatic roll feed, stock reel, & scrap cutter. Will stamp fuse tips at million/day rate.

Ultra High Speed Automatic OBI Press package with progressive dies. Will operate at variable speeds up to 1000 spm producing parts at rate of over million/day.

Overdrive Power Squaring Shear with 18" gap, ½" capacity, 144" cutting length.

400-ton Hydraulic Press Brake to be exhibited with variety of forming dies.

NIAGARA

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

District Offices and Distributors Everywhere

America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.

WELDON

New... 2½" SHANK

EXTRA HEAVY DUTY END MILLS and HOLDERS

Rugged Dependability for your Toughest Jobs

A complete line...

- 2½" diameter shanks
- 3" diameter of cut
- 12" length of cut

Write for more details

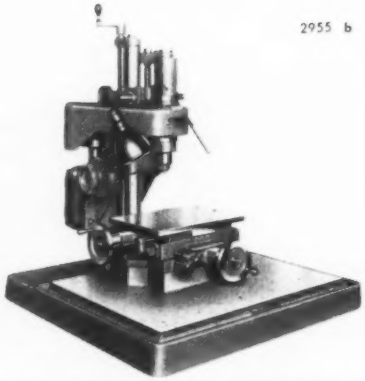
OVER 40 YEARS OF LEADERSHIP SINCE 1918

THE WELDON TOOL COMPANY

3000 Woodhill Road • Cleveland 4, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 36

CIRCLE INFORM-A-GRAM KEY NO. 37



PRODUCTION-MINDED *and* PRECISE

The NEW Hamilton-Varimatic Super Sensitive Drilling Machine is, by far, the most accurate, most rigid Varimatic we have ever built.

Mechanism, self contained, super sensitive, precise, swings radially on the column and locks at any desired station. Hand crank and screw provide 6" vertical adjustment.

Base is longer, wider, heavier than ever before. Column collar is taller and heavier for more rigid support of working unit. New design of motor mount features extra reinforcing, and this, plus a new electrically and dynamically balanced Machine Tool Motor all but eliminates vibration.

Spindle speeds are infinitely variable. A simple adjustment of the graduated hand wheel selects any desired spindle speed between 840 and 2700 R.P.M., or between 2900 and 9300 R.P.M.

New type thrust bearings eliminate back-lash, stop "break-through," reduce drill breakage.

Radial bearings are grease packed and sealed-for-life.

New rack and pinion ratios provide easier, more accurate speed settings.

Adjustable stops, easily accessible, regulate depth of hole.

HOLE CAPACITY
from .004" to 5/16"

CLEARANCES

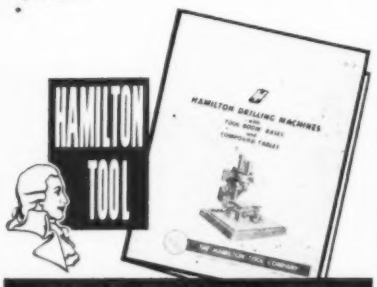
Center of Chuck to Column	5"
Base to Chuck, maximum	14"
Base to Chuck, minimum	8"

TRAVEL

Unit on Column	6"
Chuck Spindle	2½"

GET THIS!

Bulletin No. 2955 provides complete description, includes sectional drawing, lists features, gives specifications. It's free for the asking. And we'll be *glad* to have you ask.



THE HAMILTON TOOL COMPANY

832 SOUTH NINTH STREET
HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 39

MEN YOU SHOULD KNOW

Glenn R. Lord, general manager of the **Equipment Div'n; Fritz A. Gross,** assistant general manager of the **Equipment Div'n;** and **Thomas L. Phillips,** assistant general manager of the **Missile Systems Div'n,** have been elected vice presidents of **Raytheon Co.** The newly created post of manager of operations for the **Distributor Products Div'n** is handled by **Ralph B. Knapp, Jr.,** and the new **Airborne Equipment Center** is managed by **Robert E. Sonnekson.**

Andrew B. Holmstrom has retired as vice president of **Norton Co.**

Recently named chief engineer of **Pratt & Whitney Co., Inc.** is **Gordon W. Smithson.**

Maurice Gormly has been appointed the new manager of the **Products Div'n** of **The Cincinnati Milling Machine Co.** He succeeds **Philip O. Geier, Jr.,** now vice president and assistant general manager.

Newly elected president of **The Cleveland Cap Screw Co.,** a subsidiary of **Standard Pressed Steel Co.,** is **Thomas A. Fribley.**

Two changes in **The Timken Roller Bearing Co.'s Engineering Div'n** were recently announced. **H. J. Urbach,** formerly executive engineer, is now director of engineering, and **Ralph E. McKelvey,** formerly assistant chief engineer of the **Physical Laboratories,** has been promoted to assistant director of engineering.

E. Melvin Bellott has been named assistant manufacturing manager for the **Westinghouse Electric Corp.'s Lamp Div'n.**

Wilkerson Corp. has made known the addition of **Locke Howe** as manager of customer relations and the promotion of **Glenn McEntire** from chief engineer to manager of the **Quality Control Dept.; W. G. Hill,** from engineer department staff member to chief engineer; and **C. P. Schmidt,** to chief accountant and assistant treasurer.

Newly appointed plant manager of **Dana Corp.'s Auburn (Ind.) Div'n,** is **O. L. Giauque.** He succeeds **Rene C. McPherson,** recently named executive vice president of a subsidiary, **Hayes Steel Products, Ltd.**

A. S. Burgoyne, formerly vice president of manufacturing, was recently appointed to the new position of vice president and manager of **Press and Die Supply Div'n, E. W. Bliss Co.**

Joseph W. Collier has been named chief industrial engineer by **Latrobe Steel Co.**

Now serving as manufacturing superintendent for **Rubicon Div'n, Minneapolis-Honeywell Regulator Co.** is **Charles S. Marshall.**

Hugh C. Bream has been named president and general manager of **Western Design, a division of U. S. Industries, Inc.**

Staff members of the newly established mobile hydraulic division of **Racine Hydraulics & Machinery, Inc.,** include **Harold L. Robinson,** sales manager; **Clare Hellenberg,** engineering specialist; **Eugene Crossland,** application engineer; and **Edward Brannon,** product designer.

Former assistant to the vice president of engineering, **Karl F. Kellerman** has been appointed assistant to **A. P. Fontaine,** executive vice president of **The Bendix Corp.**

SKF Industries, Inc. has appointed **William C. Wright,** general manager, **Altoona Div'n; James A. Graham** succeeds Wright as production manager; **Stanley Kabala,** plant manager, Philadelphia; and **Woodrow Wilson,** Altoona plant manager. It was also announced that **Peter S. Given** is serving as manager, **Airborne Products,** a newly created post.

The new position of director of customer quality and services for **Whirlpool Corp.** is handled by **R. E. Brooker.**

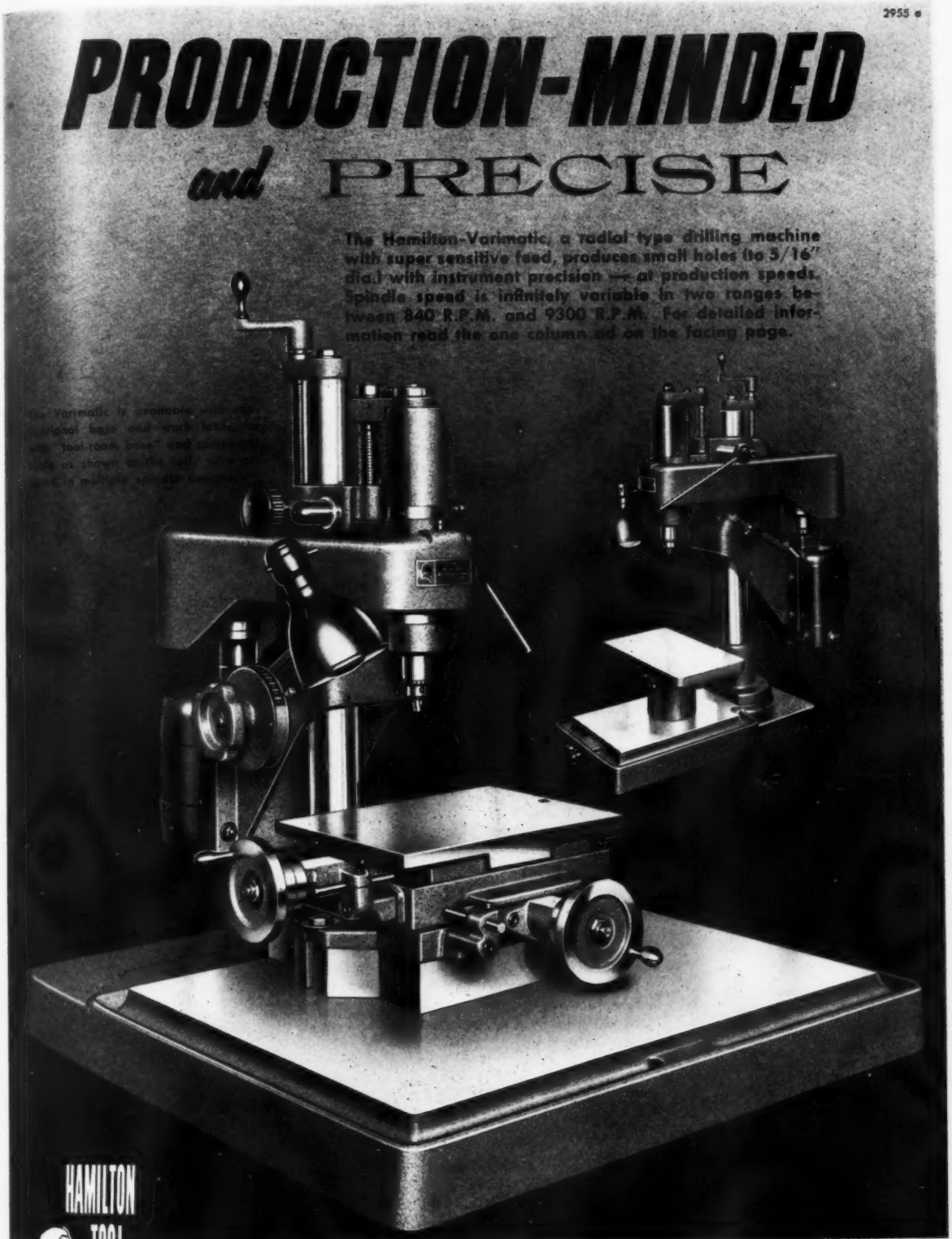
Pall Corp. recently announced the election of **Henry Petronis** as vice president of manufacturing.

The Programming Dep't, **Manufacturing Div'n of Ampex Data Products Co.,** is headed by **William Kea.**

2955 a

PRODUCTION-MINDED and PRECISE

The Hamilton-Varimatic, a radial type drilling machine with super sensitive feed, produces small holes (to 5/16" dia.) with instrument precision — at production speeds. Spindle speed is infinitely variable in two ranges between 840 R.P.M. and 9300 R.P.M. For detailed information read the one column ad on the facing page.



HAMILTON TOOL

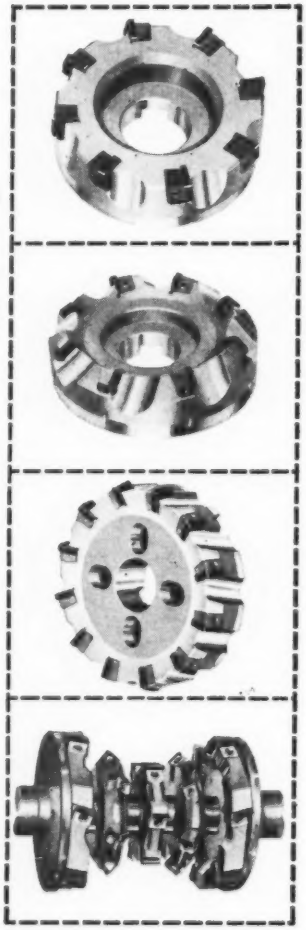
THE HAMILTON TOOL COMPANY

832 SOUTH NINTH STREET HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 39

More Milling Possible...
Milling More Profitable
with FUTURMILL

and a handful of carbide blades



Futurmill's indexable milling cutters converted so many *slow and expensive* machining methods to *fast, low cost* operations, that they established the value of "indexable tooling" . . . recognized as one of today's most important contributions to metalworking progress.

1. Lower cost metal removal

Futurmill takes the burden out of milling with inexpensive indexable carbide blades. No need to remove the cutter from the machine . . . no more cutter grinding and no more delays and lost production time. Index a Futurmill quickly and accurately, right on the machine. Eight times per blade with negative rake cutters and four times with positive. Futurmill's precision ground blades get the finest finish obtainable and more metal removed per cutting edge.

2. Plenty of muscle for any job

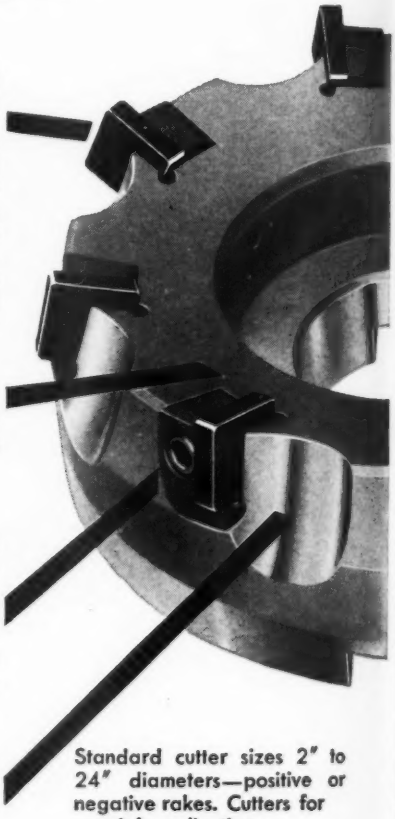
The cutter body is a solid one piece construction of heat treated alloy steel . . . not only the most rigid cutter built . . . but precision built.

3. Protection for the cutter body

The case hardened wedges behind the blades absorb the damage in case of an accident and save the cutter body . . . cutting down expense and lost production time for cutter repair or replacement . . . reducing inventory investment. With just a few extra wedges you're back in production.

4. Unobstructed chip clearance

Huge chip pockets in front of the blades direct the chips ***out and away*** from the cut—critical on steel applications and on deep cuts.



Standard cutter sizes 2" to 24" diameters—positive or negative rakes. Cutters for special applications.

FUTURMILL, INC.

6360 Highland Road • Pontiac, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 40

THE Exclusive SET
FEATURING
SAFETY FLANGES
Everywhere you go you see Superior die sets . . . the finest in all the world.
Right, Sue Perior! And just look at the safety flanges . . . they're the last word in easy handling and safety. Only Superior has them!

Exclusive SAFETY FLANGES

Recognized as one of the greatest contributions to die set handling . . . all Superior die sets — large or small — are equipped with exclusive safety flanges . . . AT NO EXTRA COST. Use Superior die sets . . . they'll save you time and money!

Write for exclusive features catalog — today!

SUPERIOR STEEL PRODUCTS CORP.
2754 South 19th Street • Milwaukee, Wisconsin
Cheshire, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 41

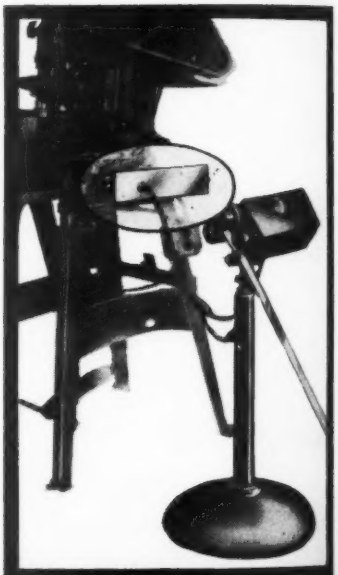
positive mechanical action MACHINE STOP

TIME TESTED . . . PRODUCTION PROVEN!

A NEW APPROACH that solves an old problem

- **ACTS INSTANTLY**
  Stops Machine when length of stock per stroke drops below a preset minimum.
  Stops Machine when stock is oversize in thickness.
  Stops Machine when stock is undersize in thickness.
  Stops Machine when defects such as burrs and tears occur in stock.
  Stops Machine when stock coil end approaches.
- **RUGGED, DEPENDABLE . . . EASY TO ADJUST**
  Has only a few simple adjustments which can be set accurately and quickly in minutes. Adjustments cannot vary, they work every time.
- **SAVES**
  Increases die life . . . saves down-time . . . saves die repair time . . . allows more machines to be run at a higher rate of speed with fewer operators in attendance.
- **ELIMINATES GUIDE-IN PROBLEMS**
  Helps as a guide for the stock entering machine.

FEED-OFF is inexpensive and versatile . . . can be easily adapted to suit your individual requirements. Contact us for further details.



PORTABLE . . . EASY TO INSTALL

FEED-OFF can be quickly moved from one machine to another. Only a Clutch-tripping Solenoid need be installed on the machine itself . . . AND NOTHING ELSE!

RANDS PRODUCTS, INC.
DEPT. C, WILLIMANTIC, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 42

MOORE ROTARY TABLES

For angular spacing jobs so precise you could never handle them before

NO. 2 ULTRA PRECISE TABLE

Reads direct to 1 sec.

Total error in any position: 2 sec.

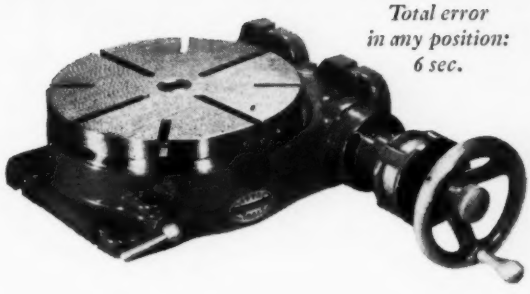
GUARANTEED POSITIONING ACCURACY FOR SHOP USE

All points in 90° increments, from zero to ± 1 sec.
All points in 18° increments, from zero to ± 1½ sec.
All points in 2° increments, from zero to ± 1¾ sec.
Worm accuracy—¼ sec.
Repetition of settings—½ sec.
Total error in any position—2 sec.
2 sec. = 0.00005" (½ tenth) on 10" dia.

Now...with this new No. 2 Moore Ultra-Precise 11-inch 2 sec. Rotary Table—you can provide the closest precision angular spacing needed today. It reads to 1 sec. and has an overall performance accuracy of ± 2 sec. throughout the entire 360°. It is being widely used in angular locations for guidance systems. A nondisengageable, thread-ground worm, combined with the accurately spaced teeth of its mating gear, makes this extreme precision possible. Loss of accuracy, due to repeated throwing in and out of the worm, is eliminated.

NO. 2 PRECISION TABLE

Reads direct to 5 sec.



Total error in any position: 6 sec.

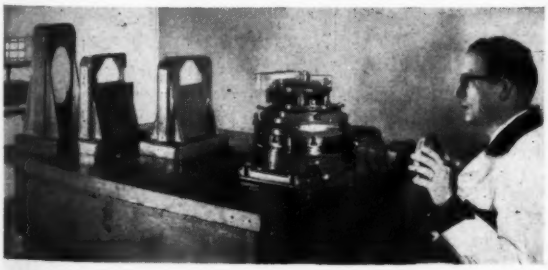
GUARANTEED POSITIONING ACCURACY FOR SHOP USE

All points in 90° increments, from zero, ± 1½ sec.
All points in 18° increments, from zero, ± 2 sec.
All points in 2° increments, from zero, ± 4 sec.
Worm accuracy—2 sec.
Repetition of settings—1 sec.
Total error in any position—6 sec.
6 sec. = .00015" (1½ tenths) on 10" dia.

This popular No. 2 Moore Precision 11-inch Rotary Table has an overall performance accuracy of ± 6 seconds throughout the entire 360°, and reads direct to 5 sec. It is being used successfully by leading companies on government-sponsored precision jobs never before accomplished. You can use this rotary table for countless precision spacing applications on jig borers and jig grinders.

* * *

Write today for descriptive literature about the Moore 2 sec. Ultra-Precise *and 6 sec.* Precision *Rotary Tables.*



Accuracy assured by interferometric inspection and calibration, the first time industry has used light-wave measuring methods for precise division of the circle.

These rotary tables are accurate in either horizontal or vertical position. Further applications are possible by using the table in conjunction with its companion unit, Model No. 2 Sine Plate.

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Connecticut

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 43

"Paid for itself in less than a year used only 4 to 5 hours per day"

Another user reports on

Hammond ELECTROLYTIC GRINDERS

THE COOPER-BESSEMER CORPORATION

MACHINERY BUILDERS — SINCE THE YEAR 1833 — ENGINES AND COMPRESSORS

MOUNT VERNON, OHIO

February 15, 1960

Hammond Machinery Builders, Inc.
1600 Douglas Avenue
Kalamazoo, Michigan

We are pleased to report that the Hammond Electrolytic Grinder we purchased in 1957, while only being used four to five hours per day, has paid for itself in less than a year.

Because of these results, we have recently purchased two more for other departments in Mount Vernon and one for our Grove City, Pennsylvania Plant.

We are getting not only a good quality tool grind job in the same length of time as before, but we have also reduced our diamond wheel consumption 80 to 90 per cent.

Yours very truly,

E. C. Phelps

E. C. Phelps,
Works Manager

Cost analysis verifies the substantial savings in carbide tool grinding these Hammond Electrolytic Grinders achieve in plant after plant. See for yourself. Send us a few single-point tools to be ground. They'll be returned promptly with a "processing and time required report." No obligation.

Hammond's OF KALAMAZOO Good Machinery Since '82

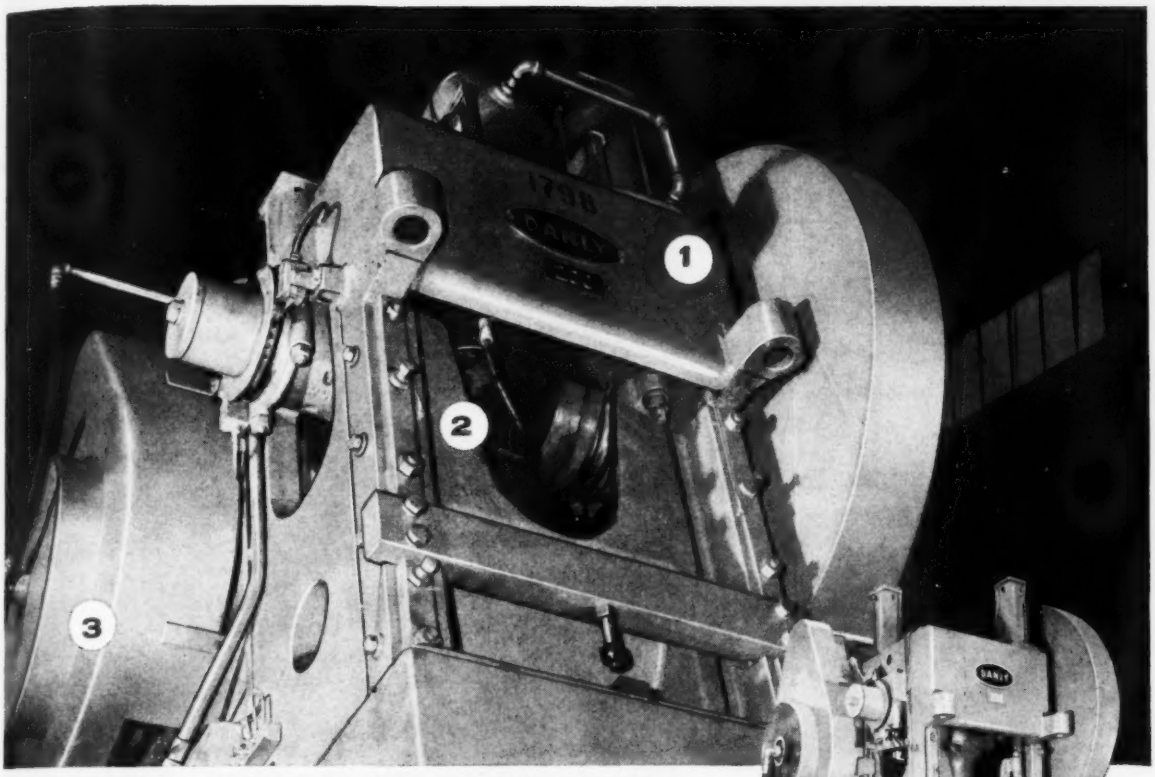
Hammond Machinery Builders INC.

1631 DOUGLAS AVE • KALAMAZOO, MICHIGAN

See Us at the Production Engineering Show, Navy Pier, Chicago, Sept. 6-16

CIRCLE INFORM-A-GRAM KEY NO. 44

FROM ANY ANGLE



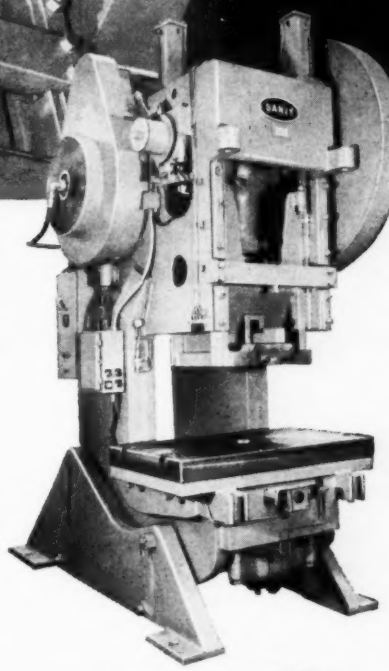
IT COSTS LESS TO RUN A DANLY O.B.I.

(1) **Compare a Danly welded-steel frame,** for example, with any comparable press available. A Danly frame is designed to the most rigid deflection standards, with extra brawn to resist shock and vibration. This means longer die life, less downtime for die maintenance, and more accurate stampings, too.

(2) **Compare the drive . . .** the forged and heat-treated crank shaft, the bronze-bushed bearings, the quiet gearing. Danly O.B.I.s are built to defy breakdowns . . . to give you bonus productive hours.

(3) **Compare the clutch . . .** the same patented air friction clutch that has made Danly presses standouts in major stamping plants around the world. Because of its low inertia design, and long-life floating friction inserts, your maintenance department can almost forget it's there.

Compare a Danly O.B.I. from *any* angle. You'll find it's built for lower cost, more dependable operation. Write for the new Danly O.B.I. Catalog and the detailed specifications will convince you.



MMT-PE

See the Danly Display
At the Machine Tool Exposition,
Booth No. 1250

DANLY

DANLY®

DANLY MACHINE SPECIALTIES, INC., 2100 SOUTH LARAMIE AVE., CHICAGO 50, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 45

Basically mechanical . . . reduces complex electronics. Positive control by direct actuation (no feedback). All controls fully integrated with the machine. So practical it needs no provision for manual operation.

Barber-Colman's New Tape-Controlled Lathe

Tape-r

Understands two languages: . . . digital data and cost

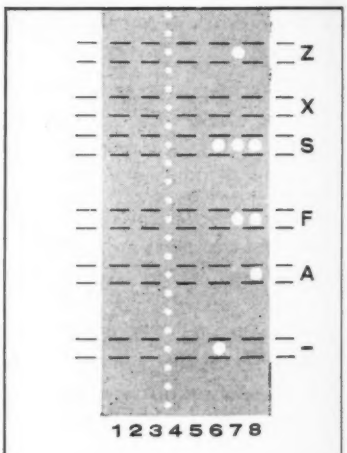
Now, you can gain all practical advantages of numerical control in a Barber-Colman precision lathe that greatly reduces complexity and equipment cost while retaining the ability to turn tapers and form simple radii.

Here is a fresh new approach to numerical control — one that removes any fear of systems incompatibility and leapfrogs into tomorrow's practicalities of low-cost operation and maintenance.

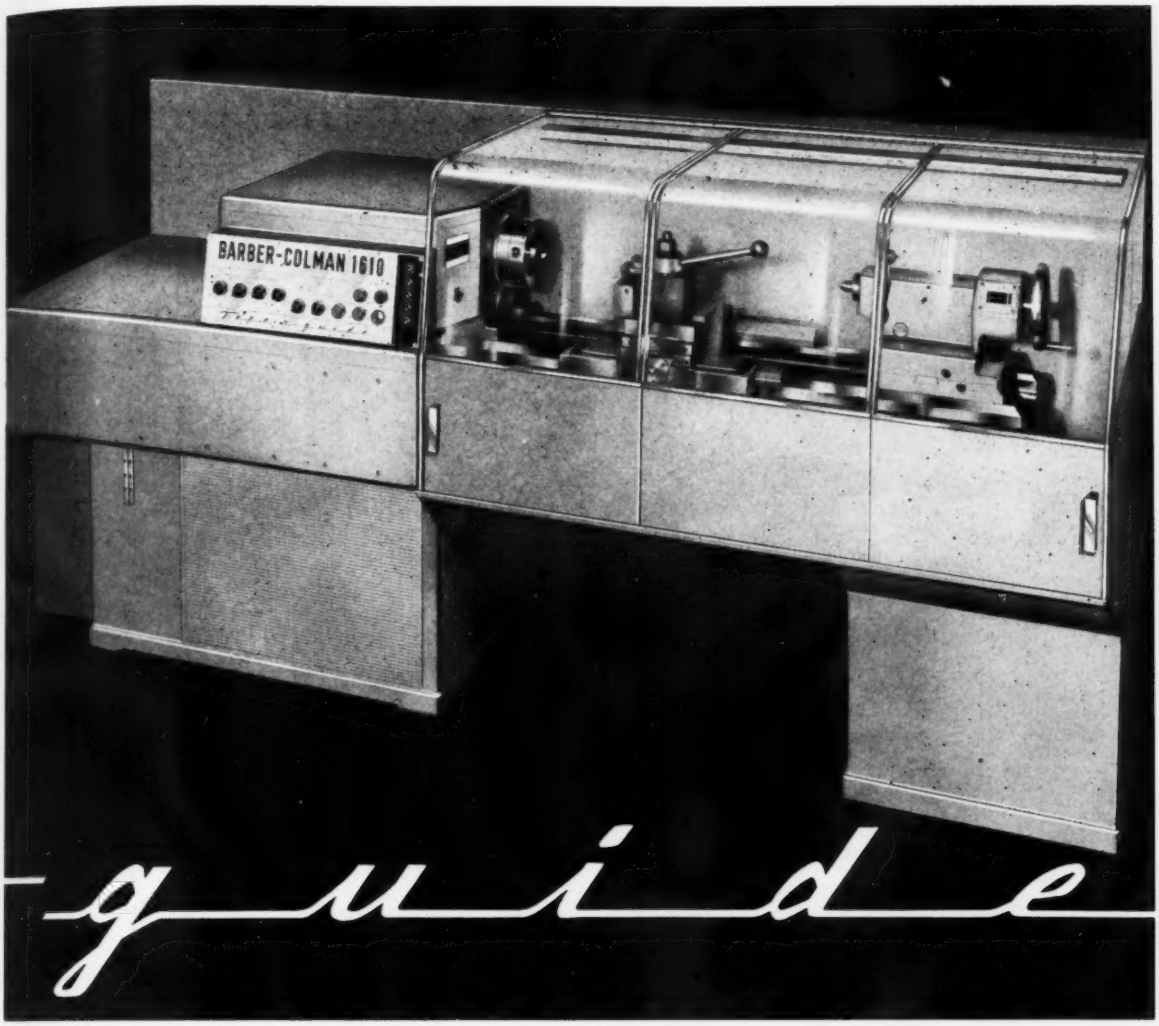
Now, you can sit in the driver's seat — relieve operating personnel of size control responsibility and set production rates on 90% of your routine jobs fitting a 16" swing lathe. The new Tape-r-guide handles all stop-start, positioning, speed adjustment, and feed change functions automatically from a simple 8-channel binary code tape. It will hold close tolerances on diameter and length, machine all practical tapers without "hunting," cut chamfers without special tools, cutoff and bore or machine at 90° to the work axis —all on a high-performance, precision lathe that has the simplified version of numerical control built-in.

The reader is part of the headstock. Controls are housed in the electrical panel on the back.

The big difference in Tape-r-guide is emphasis on simple and direct mechanical actuation. For example, compound differentials accurately control tapers. Relative speeds of the carriage and cross slide, controlled through mechanical clutches in gear trains, give you true angular tool



Simple coding . . . there are only six types of commands, and only one row is needed to give a complete "axis" command. The channels numbered one through five control rates, while the last three channels identify the command.



paths. There's no sensing and correcting of errors as with a servo drive — no complex electronics or data storage. An electrical signal from the tape reader initiates the mechanical cycle. Cycle then establishes feed rate, spindle speed, and direction . . . as well as any auxiliary functions.

The tape-coding system is simple. Only one row is needed on the tape for a complete axis command. Thus, only a few rows are required for each complete command sequence.

As an incremental system, coding is started from the first operation of the tool rather than from an absolute zero point. The over-all accuracy of the machine is limited only by the system resolution capability . . . plus or minus .001" on diameter and length. The lathe itself is the largest machine of its type on the market, produces super finishes and precision tolerances — fast. It has large swing capacities (16" and 20"), infinitely variable spindle speeds to 1200 rpm, rapid traverse of the cross slide and carriage, rugged frame castings made of dense Meehanite metal. All setup and operating controls are centralized on the headstock panel, adjacent to the tape reader.

Four dials for preselecting spindle speeds are actuated by tape commands at the proper time in the cycle. Another selector puts the machine into single-cycle operation for setup or fully automatic cycling.

Ask your Barber-Colman representative about the low cost of this basically mechanical, fully integrated, high-speed, numerically controlled lathe.

MMT-PE
MODERN MACHINE TOOLS
PRODUCTION EFFICIENCY

See the tape-controlled lathe turning tapers, too, in Booth 923 at the Exhibition. Qualified engineers will be on hand to answer questions.

Barber-Colman Company

BARBER COLMAN

97 Loomis Street, Rockford, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 47

UNIVERSAL JIG AND FIXTURE COMPONENTS AND CLAMP ASSEMBLIES

Shown here are a few of more than a thousand different items in regular steel and stainless steel —the largest and most complete selection in the United States—now available from Universal Engineering Co. Write today for your copy of the complete, new catalog.

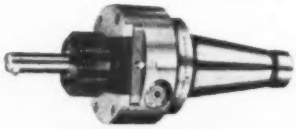
213

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS

Floating Chuck

Standard Collet Chuck

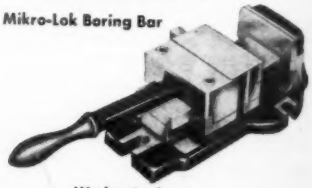
Mikro-Lok Boring Bar



Boring Chuck

"Kwik-Switch" Tool Holder

Standard Drill Bushing



Wedge-Lock Production Vise

UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 48

Master Power Corp., subsidiary of **Black & Decker Mfg. Co.**, recently appointed **Thomas J. Bennett** general sales manager and **Edgar D. McIntosh,** central district manager.

H. Fischer & Associates, Inc. has announced that **G. H. Meyfarth, Jr.,** is general manager of the recently purchased **May-Fran Mfg. Co.**

The appointment of **John J. Devlin** to sales representative in the New York Metropolitan area for **Morse Twist Drill & Machine Co.**, was made known recently.

Gerald R. Garinger, former assistant branch manager for **The Carpenter Steel Co.,** has been promoted to branch manager, Indianapolis.

Raymond L. Donaldson has joined **Besley-Welles Corp.** as service representative for the West Coast territory.

Taft-Peirce Mfg. Co. has appointed **Carl B. Klockars** to the newly created post of assistant manager of machine tool sales.

Announcement of the appointment of **John P. Smith** as sales manager of adhesives and sealers for **Cycleweld Chemical Products Div'n, Chrysler Corp.,** was made known recently.

Norton Co.'s grinding wheel field sales force now has **J. Robert Lowry** serving in Atlanta and **Robert D. Stubblebine** in Michigan.

Midwest manager for **American Drill Bushing Co.** is **Andrew M. Mezey.**

Harry Mussun has taken over as director of machine tool sales for **The Kempsmith Machine Co.**

Newly appointed Chicago district manager for **Gisholt Machine Co.** is **Ralph J. Miller, Jr. Olaf M. Nysather,** former sales representative in Houston will assist in Chicago territory sales.

Louis E. Bourgeois has been appointed New England district supervisor for **Vascoloy-Ramet Corp.,** with headquarters in Simsbury, Conn.

MEIER WEARITE®
extruded aluminum bronze

★ *for wear plates, strike plates, wear strips, ways and gibs, cam slides, lathe beds, wipers for roll forming.*

QUALITY: WEARITE is produced under strict laboratory controls. Tough (210–307 Brinell); strong (105,000 psi ultimate tensile); and smooth surfaces with excellent wear characteristics.

SIZE: 97 different rectangular sizes 1/4" to 3" thick and 1" to 6" wide.

MACHINING: Extruded WEARITE is free from porosity, and inclusions and has a homogeneous structure, improving machineability.

COST: MEIER WEARITE COSTS LESS in pound for pound of usable metal than cast wear strips.

Write for technical folder or test sample at no cost.

Meier
BRASS & ALUMINUM
Company

1471 E. NINE MILE RD.
HAZEL PARK MICH.

CIRCLE INFORM-A-GRAM KEY NO. 49

ERICKSON QUICK CHANGE HOLDERS

...for use with your standard MMS tapered tools
...designed for presetting of tools

Now you can use your present standard MMS tapered tools with the *new* Erickson Quick Change Holders. That means you get the double production advantage of Erickson's *high precision coupled with the rapid change feature.*

Several different models comprise the line: Morse taper holders for boring mills and radial drills, milling machine holders that fit standard spindle tapers, turret lathe holders that increase turret lathe tool-holding capacity, straight shank holders with #30 or #40 MMS socket. These holders take Erickson Collet Chuck milling machine adapters in both regular and heavy duty types, end mill adapters, shell and face mill adapters, Morse taper adapters, boring head adapters, and chuck adapters for Jacobs internal taper.

AA-7455

A call or card will bring the Erickson representative on the double. Meantime write for your copy of Catalog G "Erickson Quick Change Holders."

ERICKSON TOOL COMPANY

34551-9 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • EXPANDING-COLLETS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 50

How's Business?

Business is how and where you find it!

ON A RECENT TRIP into New England, I had the experience of visiting two neighboring manufacturers whose current business levels are at extreme opposition to the generally accepted business barometers.

Obviously, business is not wallowing in a depression — neither is it feasting on an all-out boom, yet these two companies are exemplifying the two extremes.

Furthermore, the two companies are so similarly situated, product-wise and market-wise, that one must conclude that the human element — the performance of individuals — has everything to do with their relative degrees of prosperity.

The first concern radiated a state of gloom that could be stirred with a fork, it was so dense! The bottom had dropped out of business over the past couple months, they said, and they were seemingly taking a sort of escapist relief in their pending plant vacation shutdown.

They just wanted to get away from it all — including editors — and it did not come under the heading of a pleasant, inspiring visit.

A mere dozen miles down the road, and I was in a different world! First of all, the second manufacturer was so busy that I felt my visit was interfering with the wheels of progress.

Two shifts were losing ground against a growing backlog of orders. They showed me, with unrestrained enthusiasm, tooling developments or innovations that were opening up new markets.

They, and their men, were out beating the bushes, uncovering applications that even the prospects didn't know they had. The hard sell, bolstered by enthusiasm and aggressive management was the order of the day.

These two examples cannot be taken as typical, but coming as they did within a few minutes of each other, the contrast was all the more striking.

One could feel, in the first instance, a bit of a longing on the part of management for the good old days, when their product was newly developed and they were working on the cream of the market. It may be cruel and even unfair to peg them simply as order takers, but who, other than order takers, would say "the orders just aren't coming in"?

The boys down the road weren't taking any time out to see whether orders were coming in — there were just too many doorbells that still needed pushing!

Our editorial trips are rich in contacts and contrasts. Admittedly, many do not offer the extremes cited above, but we are constantly confronted by the challenge of trying to sense why some enterprises are clicking in a big way, and why others will cry on your shoulder.

The answer, obviously, is people. Business is people, and management is people. Equipment is not the sole answer, because there, too, many contradictory factors are in evidence.

We were in one plant where many machine tools were operating under numerical control — and in another where a group of machines was operating under overhead shafting! Both are successful enterprises, but the most that they have in common is that both are run by people.

In answer to our oft-put question, "How's Business?" we submit that business is how and where you find it, and that some people are better at finding it than others!

▽ ▽ ▽ ▽

FOR JULY 1959 this editorial page was entitled "Radio — Boomlet or Boom?" and had to do with the new technology of Citizen Band Radio. Fortunately this writer, in choosing the title, hedged and protected himself by using both "Boomlet" and "Boom"! Whichever way the business went, flash in the pan or boom, he was safe.

It has turned out to be an electronics boom of no small magnitude, with the equipment coming to be displayed, demonstrated and sold in automobile dealerships, farm equipment stores, department stores, service dealer shops, appliance and electrical equipment shops, grain and feed stores, marinas, sporting goods houses and a host of other outlets with direct links to consumer interests.

When any commodity can rate such a gamut of marketing outlets it is certainly no flash in the pan.

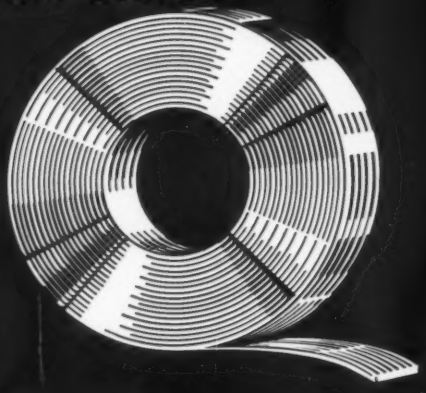
The Federal Communications Commission has had its hands more than full trying not to fall further and further behind in the issuing of licenses. FCC action has had to be taken outlawing amateur-type operations on citizens-band channels, because of the growing demand for prescribed uses of the citizens-band channels.

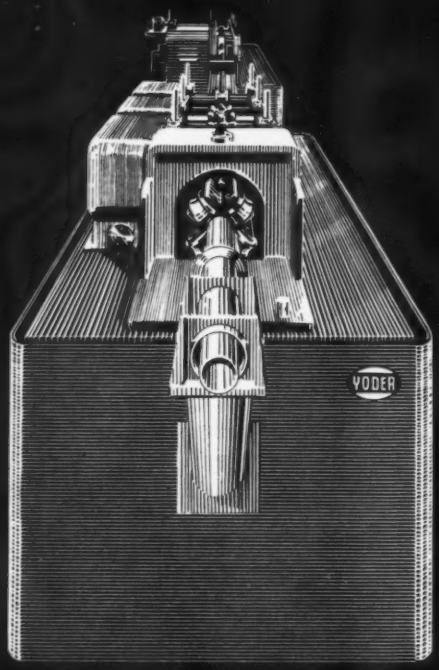
In the field of communications there has never been an example of such fast and widespread acceptance of a new medium. Its dollar volume status has become entirely unprecedented. It's good to realize our enthusiasm for Citizens-Band Radio has been justified.

E. Willard Pennington

Editor

. . . from start





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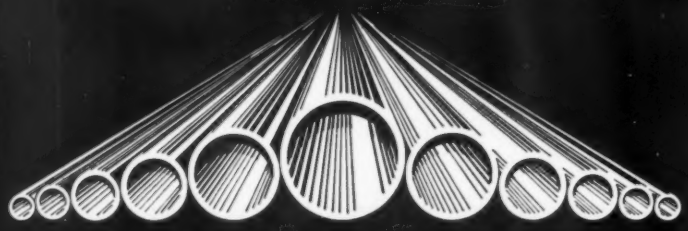

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Tool performance can be improved if the production troubleshooter applies these guide posts for recognition, analysis, and solution of tool steel heat treating and processing problems.

Fig. 1. Metallographic example of severely decarburized cutting edge, magnified 100X. Area along edge appears white because of decreased carbon content.

Tool Steel Troubleshooting

by Edward A. Steigerwald, PhD.

Dr. Steigerwald is a research engineer in Staff Development, Tapco Group (Cleveland), Thompson Ramo Wooldridge, Inc. Reader response to his popular article, "Heat Treatment of Tool Steels" (T&P, March 1960), prompted Dr. Steigerwald to outline this effective approach to tool troubles.

HOW CAN DISTORTION problems be reduced? Can tools be rehardened? Why do some tools exhibit wrinkled surfaces? These are typical questions which face production personnel and which must be solved with a minimum of time and effort. Although no all-inclusive rules can be formulated for the tool steel troubleshooter, certain problems suggest rather definite causes and can be readily solved once these causes are identified.

Optimum tool performance results from a combination of proper tool design, steel selection, heat treatment, grinding, and usage. Tools cracking through deep stamp marks or at sharp corners which join heavy and thin sections are typical of improper design, while failures due to overheating from use at high speeds or with lack of coolant are exemplary of misuse.

The faults related to design and misusage will not be analyzed in this article. Only the most widely observed metallurgical problems related to tool steel heat treating and processing will be discussed, from the standpoint of relating the specific problem to its most probable cause so that a remedy can be prescribed.

Abnormally Rapid Wear

Abnormally rapid tool wear can range in seriousness from the extreme case of the complete "wiping away" of the cutting edge on a drill or reamer when the tool first enters the cut, to a general

Fig. 2. Brittle failure of end mill cutting edge due to overheating during hardening treatment.

decrease in performance over a long production run. The high wear rate may be caused by decarburization of the tool surface (Fig. 1). Since the hardness of heat treated steel depends markedly on the carbon content, a lowering of the surface carbon due to exposure to oxidizing conditions can produce low surface hardness and accompanying low wear resistance.

In most cases, the processing of the steel billet at the mill involves exposure to oxidizing conditions and the raw tool material generally has some mill decarburization on the surface. This decarburized layer, known as "bark," is generally removed during the rough machining operation prior to heat treatment. Table I lists the recommended allowances for stock removal which virtually insure elimination of bark as a potential source of soft tool skins.

Since bark is usually eliminated by machining, the most frequent cause of poor wear resistance is the surface decarburization which occurs during hardening. Most tool steels require high austenitizing temperatures, ranging from 1800° to 2350°F, and at these temperatures decarburization can occur very rapidly in furnace atmospheres or salt baths even under the slightest oxidizing conditions.

Atmosphere control is particularly important in the molybdenum-type high speed steels. When abnormal wear occurs with this grade of material, surface decarburization should be the immediate "suspect" and the hardening conditions examined. The file test for hardness is a rapid and fairly accurate means of qualitatively determining the degree of decarburization and represents a convenient aid for the troubleshooter.

In addition to the abnormally rapid wear produced by soft skins, the use of improper heat treating temperatures can also produce a soft tool. Over-all tool softness can be readily distinguished from decarburization by comparing surface and core hardness.

The general hardening cycle involves heating to a relatively high temperature (austenization), quenching in water, oil, or air depending on the steel grade, and then tempering (drawing). A soft tool is *usually* the result of too low a hardening temperature, too slow a quenching rate, or too high a tempering temperature. The solution to the problem involves reviewing the accepted procedures recommended by the material producer and making sure that they are followed in production.

Improper Grinding

The third factor which can account for poor tool wear is abusive grinding of the heat treated tool. The heat generated by grinding improperly can be sufficiently high to locally overtemper or even reaustenitize the steel. Over-tempering is analogous to employing too high a draw temperature, while reaustenization involves the use of too low a hardening temperature. Both of these factors were previously listed as potential causes of low hardness.

Grinding burn, or grinding softness, is often a very subtle prob-

Table I.

OD of Raw Material	Allowance on Diameter for Machining
1/4" to 1/2"	1/32"
Over 1/2" to 1"	1/16"
Over 1" to 2 1/2"	1/8"
Over 2 1/2" to 5"	1/4"
Over 5"	3/8"

Table II
Summary Of Common Tool Steel Problems

Problem	Cause	Solution
Abnormally rapid wear	*Soft Skins*	
	Decarburization	*Improve atmosphere control during hardening*
	Excessive mill bark or insufficient stock removal during rough machining	*Alter machining operations*
	Grinding burn	*Improve grinding procedure*
	Over-all tool softness	
	Low hardening temperature *Excessive draw temperature* *Improper quenching*	*Correct heat treat cycles*
Brittleness During Service	*Overheating during hardening* *Improper tempering*	*Correct heat treat cycles*
Fish Scale Fracture	*Large grain size produced in high speed steels by rehardening*	*Anneal before rehardening*
Excessive Distortion (Cracking during heat treatment)	*Poor tool design*	*Redesign*
	Rough machining stresses	*Stress relieve before heat treatment*
	Abusive heating and cooling procedures	*Preheat and postheat*
Wrinkling of Tool Surfaces	*Localized surface melting due to carburization*	*Improve atmosphere control*

lem to discover and a difficult one to solve. In large production runs which employ border-line operating conditions, only the tools ground just prior to wheel dressing may burn. Therefore, a spot check of a group of tools may not detect the defect.

In some cases, tool discoloration (burning) may be an indication of grinding troubles, but a visual examination is not always accurate. External discoloration does not always mean that the actual steel microstructure has been harmed. On the other hand, if harm has been done discoloration can be removed by polishing or honing, but the defect will still remain below the surface.

Although several types of macroetches have been used with moderate success to detect grinding burn, the most conclusive evidence is from metallographic examination. The metallographic nature of severe grinding burn is characterized by a light-etching, whitish, rehardened structure at the surface, followed by a darker section which represents the area where the temperature during grinding was high enough to overtemper only. This sequence of light and dark bands blends into the normal core appearance.

Brittleness During Service

Excessive brittleness in tools can produce a gamut of failure conditions—from rapid wear by spalling of cutting edges or working surfaces (Fig. 2) to catastrophic

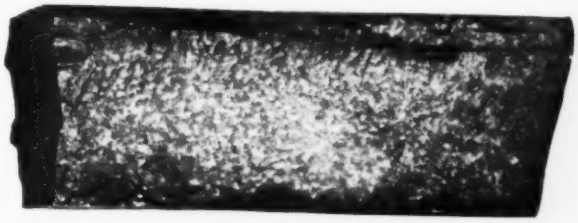
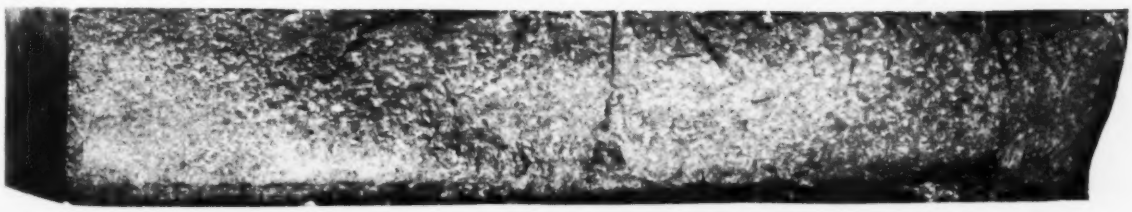


Fig. 3. Pronounced marble-like surfaces of hss wheel-forming tool indicate fish scale fracture due to rehardening without an intermediate anneal.

Photo courtesy Bethlehem Steel Co.



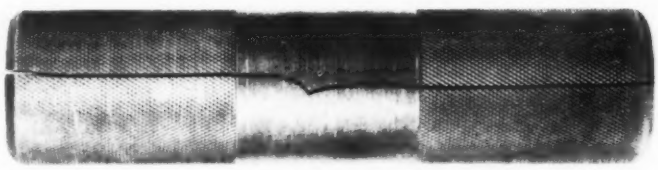


Photo courtesy Bethlehem Steel Co.

Fig. 4. Cracking of this 1⅜" dia gage, made of manganese oil-hardening steel, was caused by failure to temper immediately after the quench.

failure of large sections of the tool. Overheating during hardening, a classic cause of brittleness, can always be detected by metallographic examination, and in many cases by above-normal hardness readings.

Lack of tempering or use of draw temperatures below the recommended range will also produce brittleness. This defect cannot always be detected by hardness determinations and a critical review of the heat treatment procedure and/or a microexamination must be employed.

In the highly alloyed tool and high speed steels the normal sequence of hardening, quenching, and tempering should be extended to include a second tempering operation performed after the tool has cooled to room temperature from the initial draw. This minimizes the tendency for spalling of the working surfaces.

Fish Scale Fracture

A fish scale or marble-like fracture appearance in a tool steel is characteristic of a defect which always results in extreme tool brittleness. It is produced in high speed steels, and under certain conditions in hot-work die steels, by rehardening. The marble-like appearance of the fracture (Fig. 3) is caused by the growth of extremely large grains which occur during the second hardening cycle.

Although the exact degree of grain growth is dependent on the particular hardening temperatures employed, *a high speed tool should never be rehardened without first annealing.* The anneal, to be fully effective, should be conducted by slow heating through the 1200° to 1550°F range, then heating to 1650°F, followed by slow furnace cooling.

Excessive Distortion

It is especially difficult to formulate specific troubleshooting guide-posts to combat distortion, but several general approaches to the problem are available.

In cases where severe rough machining has been done on the tool, a stress relief or anneal prior to heat treatment has proved effective in decreasing distortion. Warping and cracking during heat treatment (Fig. 4), which is actually the ultimate condition of distortion, can be reduced by employing specific preheating and postheating cycles or by decreasing the quenching rate. These treatments reduce the thermal gradients in large sections and, therefore, combat the degree of distortion which is caused by unequal thermal expansion.

Straightening procedures should always be performed during the cooling cycle while the tool is hot, or at least, before the draw. When the steel is in this condition it has a large amount of relatively soft, retained austenite which easily takes a permanent set. After tempering, the retained austenite has been removed from the microstructure and satisfactory straightening is extremely difficult.

Wrinkling

Wrinkling of a tool surface (Fig. 5) during heat treatment is a relatively minor defect which, in itself, may not influence performance, but it indicates poor furnace atmosphere control of carbon content. In the high speed steels the hardening temperature is relatively close to the temperature where melting begins.

If the furnace atmosphere is stagnant, excessive carburization can occur locally and this addition of carbon to the material can lower the melting point sufficiently so that melting occurs on the tool surface, and produces the wrinkled surface appearance. Of course, the carburized surface is also extremely brittle and, when present on a cutting edge, can lead to poor performance.

A summary of the most common tool steel troubles is presented in Table II, along with the possible causes and solutions. Although these problems and cures certainly do not represent all the tool steel ailments, they can serve as a guide to rapid troubleshooting analyses.

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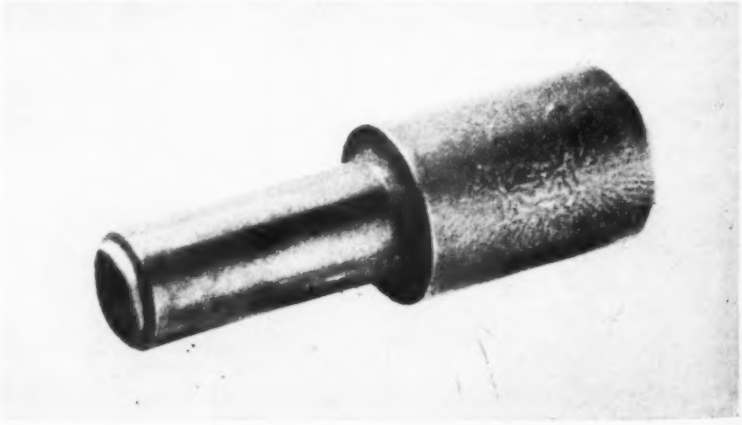


Fig. 5. Section of a cutting tool with wrinkled surface on large diameter.

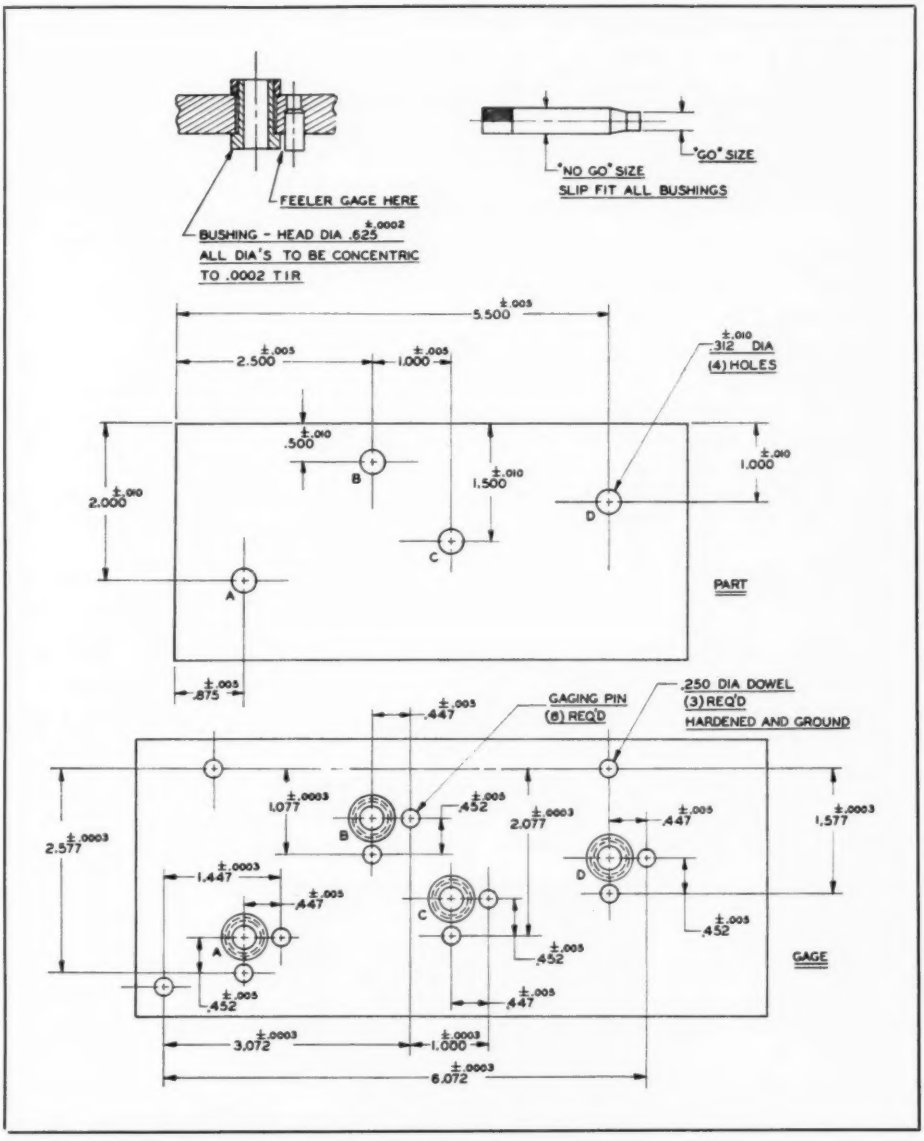


Fig. 1. The problem and solution are visibly explained here: Holes in the flat part are to be location-checked by the gage. The gage is placed over the part and located by the bank pins. After a bushing is positioned by the pin an appropriate feeler gage is tried between bushing head and gage pin.

One Way to Make A Hole Location Gage

by John Reifel

Mr. Reifel is Tool Engineer at the Missile Battery Division of The Electric Storage Battery Co., Raleigh, North Carolina.

THE PROBLEM was to quickly inspect hole locations and diameter tolerances. But the tolerances were not "that" close, so the inspection tool had to be simple and yet rugged. In reality, it was capable of checking other dimensions than those shown.

In Figure 1 it is seen that hole locations are taken from the left and top edges of the part, and three 0.250" dia pins were arranged on the gage as bank points to

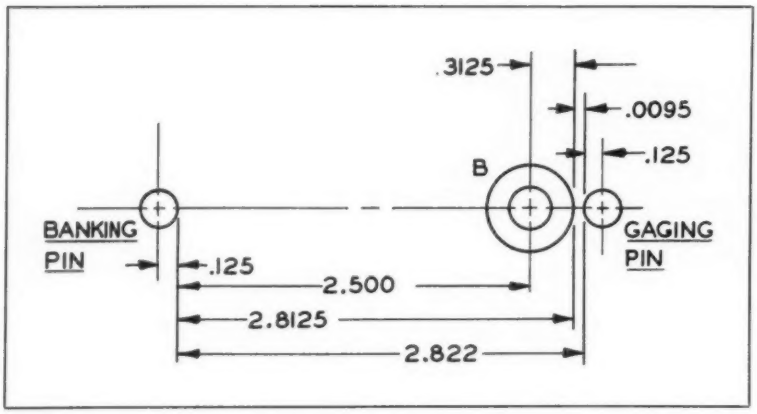


Fig. 2. If the "B" hole (part) is misplaced by 0.005" from its nominal center location, and to the right, an inserted pin will move the floating bushing to the right. The gap between the bushing head and the gaging pin will be 0.005". This actual off-center location can be determined by the use of an appropriate feeler gage.

establish the part-fixture relationship.

Let's use the "B" hole to explain the function of the gage. The "B" hole is located 2.500" (± 0.005) from the left edge of the part and 0.500" (±0.010) from its top edge. A gage pin is located 3.072" (±0.0003) from the banking pin on the left. If we subtract half the gage pin dia (0.125") and half the banking pin dia (0.125") from the dimension between these pins, we get 2.822". If we then add half the floating bushing dia (0.3125") to the desired 2.500" part dimension, we get 2.8125". Therefore, if we ignore location and other tolerances for gaging pins and bushing, we can say the floating bushing is located exactly the 2.500" part dimension from the end and a feeler gage 0.0095" thick would check out the hole.

An off location condition in any direction can be determined in the same manner, and if tolerance requirements are very exacting, dial indicators can be used instead of pins and feelers. Also, gage manufacturing tolerances, which always accumulate, can be minimized. This is done by closely determining the actual dimensions and locations of gage components and stamping feeler gages accordingly.

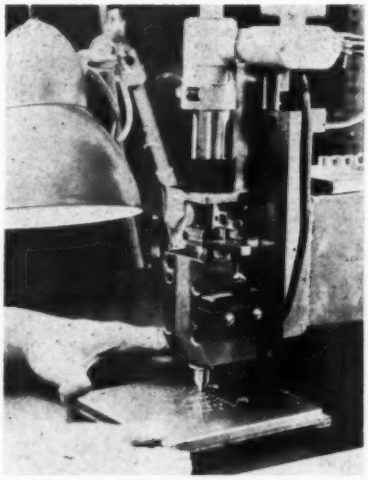
Our experience with this type of gage has been very satisfactory. Instead of conventional feeler gages for checking to particularly close tolerances, we use step blocks ground to "go" and "no go" sizes.

New Drilling Method Cuts Scrap, Ups Output

A new method of precision drilling circuit boards with semi-automatic equipment has reduced scrap and increased output at Librascope Division, General Precision, Inc. The semi-automatic unit consists of a table, a special positioning "finger" located above the table, and an electrically controlled drill below the table.

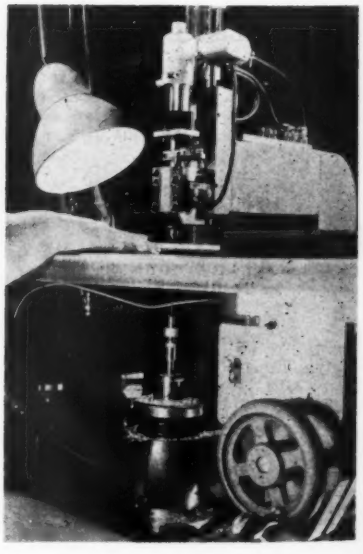
An operator gangs five circuit boards by placing them in a rigid metal plate, backed by reinforced plastic. The surface of the plate contains a drilling pattern etched into the metal, with positioning indentations to correspond to the hole to be drilled. The boards are held in alignment by holes which are precision drilled before the circuits are etched.

The loaded fixture is placed on the drill table with the metal plate up, and the positioning finger is guided along the drilling pattern by the operator. As the finger drops into each indentation, the operator touches a toe switch and



a special carbide drill, located below the tables, does the drilling. The drill is completely automatic, rising at a controlled rate and spinning at a pre-set speed. It won't operate unless the positioning finger is located directly in the center of an indentation on the fixture's pattern.

All five boards are drilled at the same time, and the drill bottoms in the plastic backing of the fixture. At the completion of the stroke, the drill returns to the rest position and the finger is guided by the operator to the next indentation.



A Study in Hydraulics . . . and filtration

HYDRAULIC POWER PACKAGES for numerically controlled machines are designed for 10,000 hrs of operation without major overhaul. Reliability is mandatory if the user is to realize the savings potential of this equipment.

Tool movement is brought about by servo valve controlled hydraulic piston motors that rotate lead screws for exact linear movement. Machining accuracy depends on the ability of the numerical control system and heavily on the performance of the hydraulic power package. Due to this, the hydraulic system requires filtration to 10 microns to minimize wear — especially of sharp lands of servo valve spools.

Without this level of filtration, particles flowing through operational components of the system can lower its life and, more particularly, its reliability. This is easy to appreciate if you know that components of these units are built to extremely close tolerances, and that small orifices and moving parts may become clogged.

Dual-bowl filters have double the flow and filtration capacity of single bowl units, so they can be counted on to increase operational reliability of tape controlled machine tools.

The major advantages of the high pressure bowl are its light weight and compact design, which still gives a high flow rate and filtration capacity. In designing these filters, Bendix Filter Division engineers knew that a single-bowl for the same pressure, having high flow characteristics, would require a larger envelope and heavier wall thickness. High pressure single-bowl units connected in parallel would offer the same results, but these would weigh more and require more space. In addition, the number of connections would be doubled.

Using MIL-H-5606 fluid, with a pressure drop across the filter of

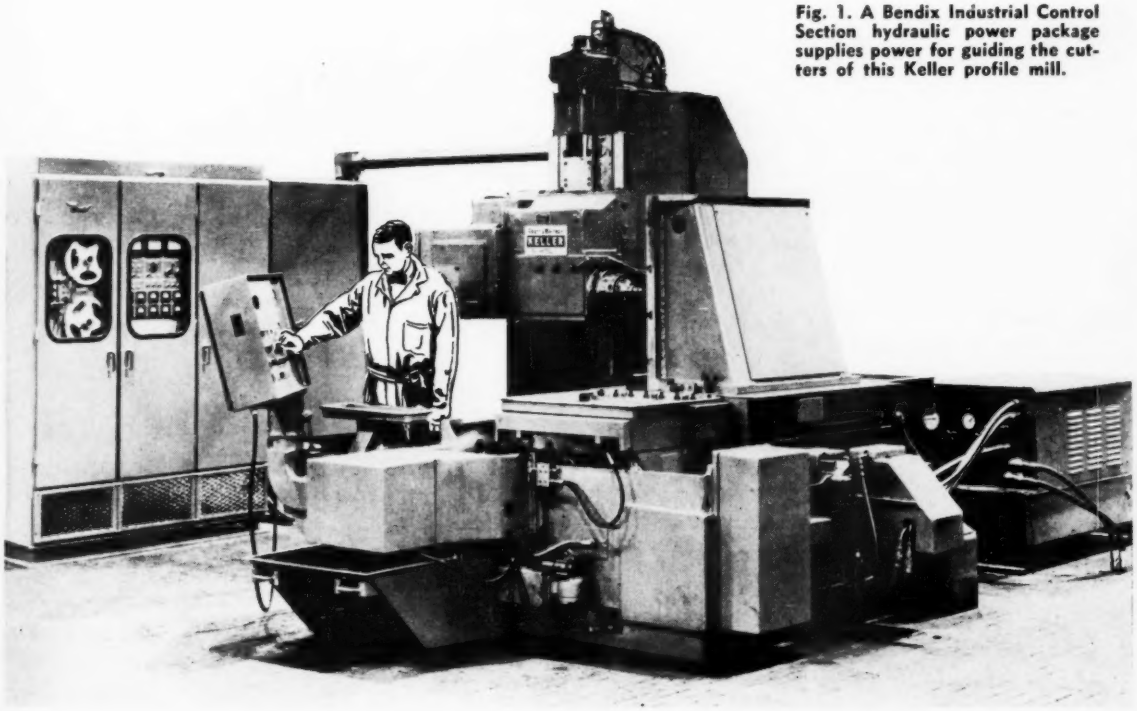


Fig. 1. A Bendix Industrial Control Section hydraulic power package supplies power for guiding the cutters of this Keller profile mill.

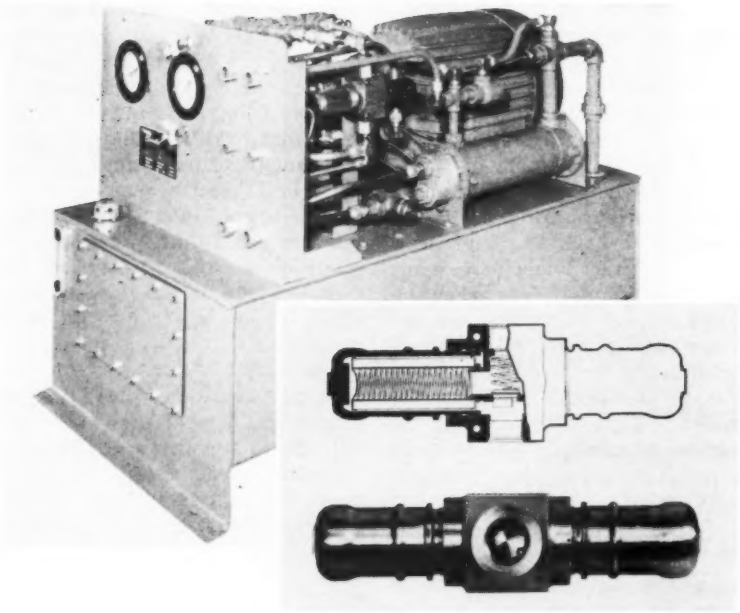


Fig. 2. A dual-bowl filter is used for full flow and full pressure.

10 psi, 24 gpm can flow through the dual-bowl unit. The hydraulic power package operates at 3000 psi whereas the filter is rated at 5000 psi having a burst pressure of 12,000 psi.

Filter elements are made from special phenolic resin-impregnated cellulose material called Micropleat. The hydraulic fluid passes through this for cleaning to a nominal level of 10 microns. This means that 98% of all particles 10 microns (0.00039") in size or larger are trapped by the filter.

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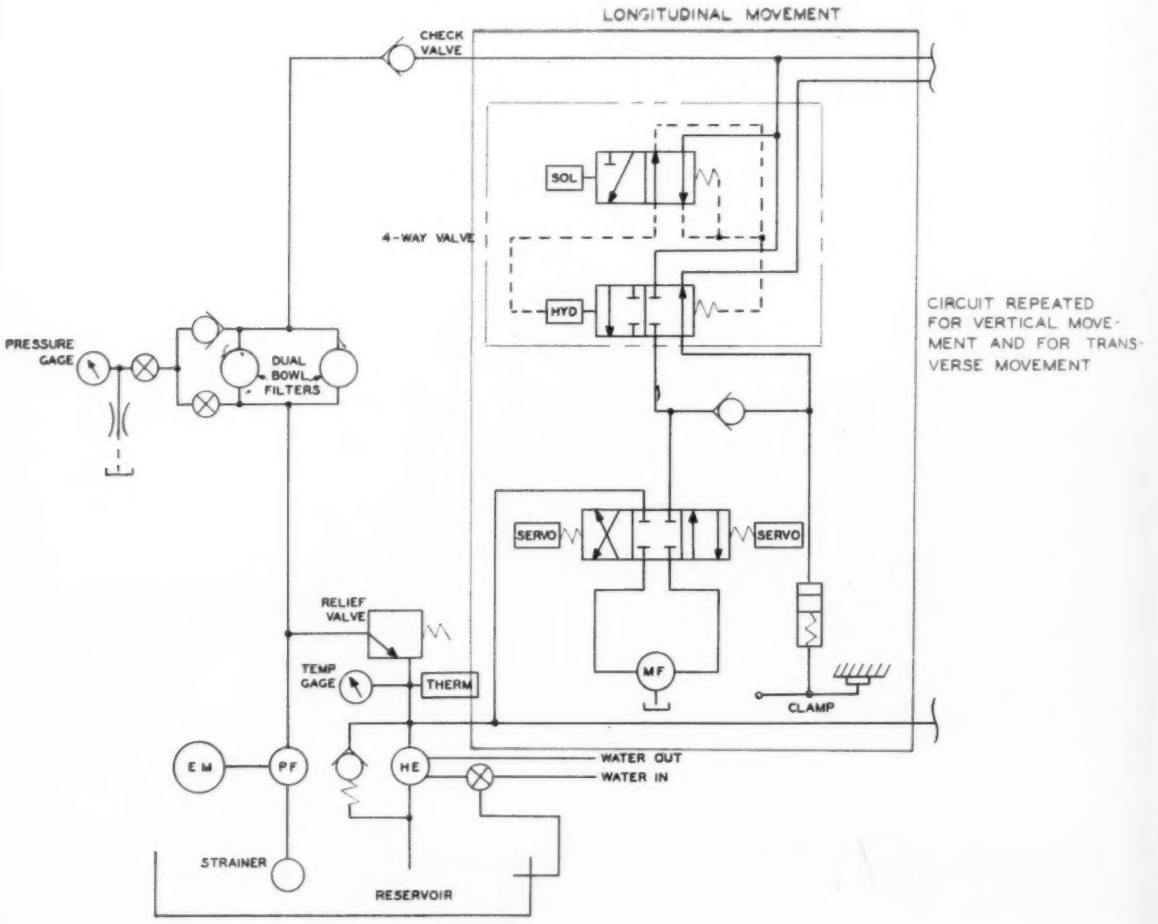
Fig. 3. The circuit diagram of the numerically controlled hydraulic system. Diagram is not complete for machine movement in the other two planes; boxed circuitry would be repeated for each of these movements.



Man-Made Diamonds Vs. Natural

. . . for Surface Grinding Carbides

Looking for ways to cut grinding wheel costs? These laboratory tests of synthetic and natural diamonds are a source of useful data for economy-minded companies.

by N. L. Leventhal

Mr. Leventhal is Diamond Application Engineer with the Metallurgical Products Department of General Electric Company, in Detroit, Michigan.

IN MANY PLANTS using diamond wheels for grinding or cutting carbide, glass, ceramics, germanium and other hard materials, continuous studies are made to obtain the wheel giving the lowest overall grinding cost. Results obtained by users in smaller plants, however, are often not worth the expense of the records involved and the time consumed because the great variety of shapes to be ground make it almost impossible to measure and compute volume removal vs. wheel wear. The data presented here are an attempt to provide dependable information to those users not able to compare wheel life accurately. Users who are able to measure diamond wheel wear against volume of stock removed can use the data for comparative purposes.

Test Conditions

The tests were made in the General Electric Diamond Application Test Laboratory under fixed conditions simulating those normally found in a production shop. In the laboratory tests, however, only one grade of carbide was tested at any one time.

The machine used was a Norton S-3, 6" x 18" hydraulic surface grinder with automatic table speed and crossfeed. The tests were run using 5" x 3/16" resinoid D1A1 (straight) wheels (100 grit, 100 concentration) at surface grinding conditions of 0.050" crossfeed/pass, 50 fpm table speed, wheel speed of 5500 sfpm, and downfeeds varying from 0.001" to 0.003"/pass. The test blocks (Fig. 1) were approximately 24 sq. in. in area and composed of carbide inserts cemented to a steel block with epoxy resin.

Both natural and man-made diamond wheels were made at the same time with the same resin batch and cured side by side.

A comparison of grinding ratios of man-made and natural diamonds in grinding wheels was made for three grades of Carboloy cemented tungsten carbide at downfeeds of 0.001", 0.002", and

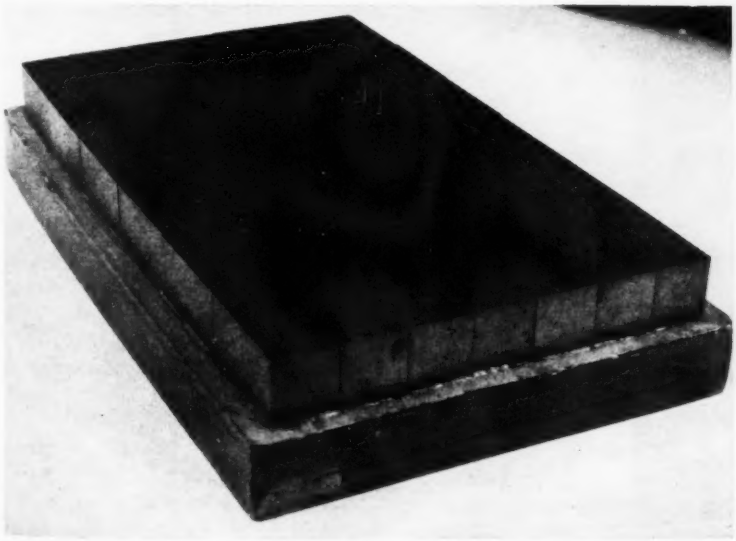


Fig. 1. Carbide inserts cemented to a steel block with epoxy resin were used in laboratory diamond grinding tests.

Table I
Comparison of Grinding Ratios
(Cu. In. Carbide Removed Per Cu. In. of Wheel Wear)

Carboloy Grade	883			44A			370		
Downfeed/Pass	0.001"	0.002"	0.003"	0.001"	0.002"	0.003"	0.001"	0.002"	0.003"
Natural Diamond	39	17	13	32	14	8	22	12	9
Man-Made Diamond (General Electric Type RVG)	144	30	18	103	20	13	76	18	13

0.003"/pass, grinding with soluble oil-water coolant. The grinding ratio is the volumetric relationship between carbide removal and wheel wear and is considered the standard method for measuring diamond wheel performance.

The carbides used were Grade 883, a general purpose carbide for machining cast iron and non-ferrous materials; Grade 44A, a roughing grade for non-ferrous materials; and Grade 370, for heavy duty roughing and general machining of ferrous materials (except cast iron).

Grinding Ratios and Wheel Life

Table I shows the effects of different grades of carbide and increases in downfeed/pass on wheel life. The grinding ratios of the man-made diamond wheels was greater for all feeds and carbide grades.

At 0.001" downfeed/pass there was practically a 2:1 difference in wheel life when switching from Grade 883 to Grade 370. When feeds of 0.002" and 0.003"/pass were used, the bond holding the diamond particles broke down prematurely, giving rise to less of a difference between carbide grades.

While it is poor practice to surface grind at 0.002" and 0.003" downfeed/pass, these conditions were evaluated to determine whether the higher friability of the man-made diamond at the heavier infeeds would be cause for failure.

Wheel life was drastically reduced as downfeeds were increased. The results showed that the efficiency of the man-made diamond wheel decreased by a larger percentage when grinding conditions were changed from 0.001" to 0.002" downfeed/pass, but that they continued to maintain a higher ratio than the natural diamond wheels even at the heavier downfeeds.

The man-made diamonds showed less wear and therefore removed more carbide per unit time than the natural diamonds (Table II). Since specific downfeed equals wheel wear plus depth of cut, it follows that the less the wheel wear, the greater the actual depth of cut.

Laboratory tests were also made to determine the grinding ratio and wheel wear of the new Selected Natural Diamonds (SND). They are more friable than ordinary natural diamonds and are comprised of slivers and flats.

A comparison of the man-made, natural untreated, and natural SND treated diamonds showed that in a straight wheel for peripheral grinding the SND natural diamond was more efficient than the normal natural diamond but only 50% as efficient as the man-made diamond. The natural untreated had a grinding ratio of 22 and wheel wear/cu. in. of carbide removed of 0.0306"; the natural SND treated had a grinding ratio of 37 and wheel wear of 0.0185"; and the Type RVG man-made had a grinding ratio of 76 and wheel wear of 0.0088".

As shown in Table II, removal of 1 cu. in. of carbide took approximately 50% as long when grinding at 0.003" downfeed/pass as at

Fig. 2. Shape and friability of these man-made diamonds for resinoid or vitrified bond wheels contributed to their good performance in General Electric's laboratory tests.

Table II

Time Required and Wheel Wear for Removal of 1 Cu. In. of Carbide

Carboloy Grade		883			44A			370		
Downfeed/Pass		0.001"	0.002"	0.003"	0.001"	0.002"	0.003"	0.001"	0.002"	0.003"
	Wear (inches)	0.0174	0.0405	0.0530	0.0210	0.0492	0.0857	0.0306	0.0595	0.0840
Natural Diamond										
	Time (min.) to grind 1 cu. in.	94	58	46	116	70	59	123	74	62
	Wear (inches)	0.0047	0.0227	0.0390	0.0065	0.0334	0.0517	0.0088	0.0370	0.0527
Man-Made Diamond (General Electric Type RVG)										
	Time (min.) to grind 1 cu. in.	81	49	38	98	60	50	100	64	49

0.001" downfeed/pass. The cost of increased wheel wear at the heavier downfeed, however, would normally be considerably greater than the labor saving due to the shorter grinding time.

Interrupted Cuts

Since all of the tests were performed on 4" x 6" x ½" solid blocks of carbide, a condition not commonly found in toolrooms, test blocks were also assembled to give interrupted cuts. The same area of carbide was used but the Grade 370 carbide inserts were spaced so that there was an interruption of ½" between pieces. Test conditions of 0.001" downfeed/pass were maintained.

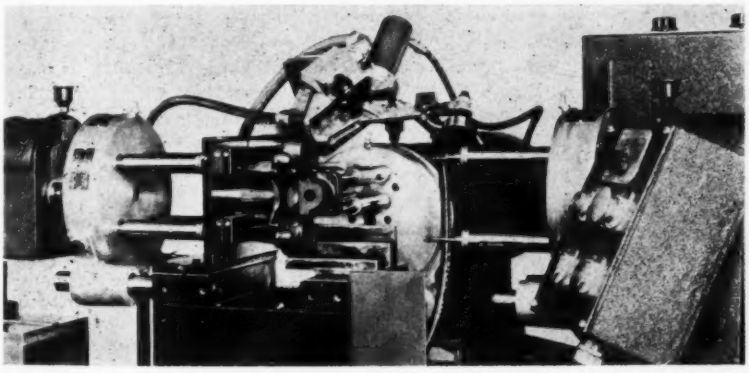
Wheel wear and grinding ratio were essentially the same whether grinding a solid block or making interrupted cuts. The wear seemed wholly dependent on the volume of carbide ground rather than test block configuration.

The performance of the synthetic diamonds tested may be attributed to two basic factors—friability and particle shape. Friability is the ability of a particle to break down as points dull. Thus, instead of dulling occurring to the point where the crystal is pulled out of the bond, new cutting edges are generated so that the crystal is retained much longer in the bond and available to do useful work. This also means that a friable crystal contributes to the retention of corners on wheels more effectively.

Particle shape affects the ability of the bond to hold the abrasive grain in position until it has done its abrasive job. The rough surface characteristic of the synthetic diamonds provides protrusions and re-entrant angles that enable them to be retained much more effectively in the bond.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

Multiple Tapping Unit Speeds Production



Cast iron compressor blocks are produced at the rate of 325/hr on a special 3-way horizontal lead screw tapping machine at the plant of a leading automobile manufacturer. The multiple tapper, made by Ettco Tool & Machine Co., Inc., taps four ¼-20 holes, four #8-32 holes, and two ¼-20 holes in three directions.

The standard Ettco components used in the machine include three ATU #3 lead screw tapping units, a standard 6" rapid traverse sliding sub-base, and three custom-built fixed spindle multiple tapping heads, on a standard ground machine table with built-in coolant tank and pump.

The tapping fixture is custom-built and designed for maximum production with automatic clamping and unclamping. It was unit-engineered for use with multiple tapping heads and aligned with fixture and lead screw units using built-in guide rods.

Tap protection is provided by individual lead screw unit electromagnetic clutch control, while correct operational sequencing is provided for by electrical interlocks.

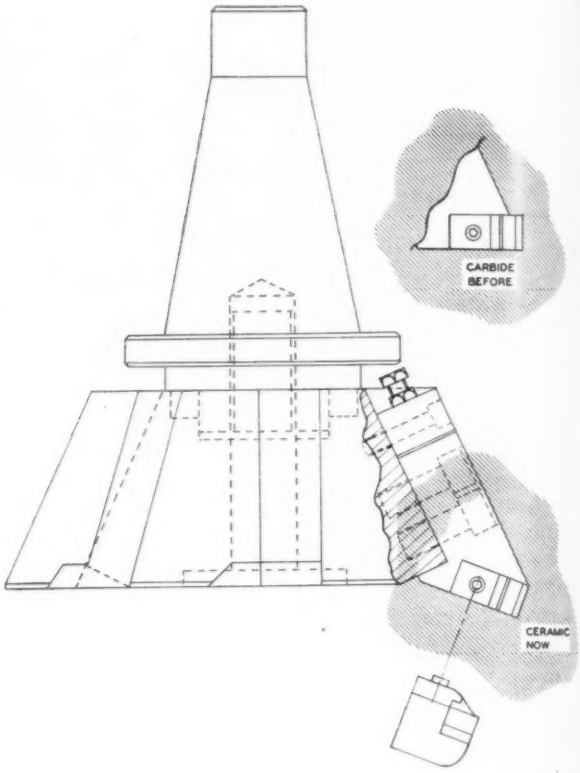


Fig. 1. To improve finish and price this already husky cutter was adapted from carbide to ceramic tool bits. Before, no corner angle was used; now, with a 20° corner angle, a thinner chip is realized. This, along with increasing the sfpm, permitted increasing the feed rate.

Operating Data

Material	Cast Iron, 200 Bhn
Machine	15 hp vertical mill
Speed	900 sfpm (was 400 sfpm)
Feed	4½ ipm (was 3½ ipm)
Depth of Cut	0.150" approx.
Length of Cut	24"
Diameter of Cutter	8"—special design, see Fig. 1
Cutting Elements	½" x ½" x 5/16" ceramic inserts

Face Up To Ceramics

. . . where applicable

It is all too common that the average engineer feels defeat—even before consideration—when ceramic cutting tools are suggested.

by Horace Frommelt

Mr. Frommelt is Director of the Manufacturing Research Center, Ferro Powdered Metals Inc., Salem, Ind.

ALMOST ANYONE WILL ADMIT attention to detail often permits doing a job that couldn't be done otherwise. And yet a number of jobs in process in many facilities will continue to give trouble — until they are willing to look beyond the tool geometry and specifications of "the last similar job."

It is the purpose of this article to show how one or two simple detail changes can effect results. In this instance, results amounted to achieving a finish far superior to the former finish without a grind operation — a finish that blued-up to 95% contact. Previously, obtaining a satisfactory finish had them in trouble for a decent piece-price.

It should be made clear that just changing the cutting elements, from carbide to ceramic, was not enough; to obtain finish as well as increase production it was necessary to increase the feed rate. Since the sfpm was to be higher, this was permissible — usually the case with ceramics. Also, while striving for optimum results, you often create more sensitive parameters.

Converting a milling operation to ceramics is, in itself, a neat trick that requires attention to detail to acquire everything in favor. One favorable condition already existed, however, in that the previous use of carbide had dictated a vertical mill with sufficient rigidity and power. A sizable taper socket was also available for cutter body heft.

The 8" dia cutter body carries eight tool bits whose 20° approach (corner) angle is part of the answer. Other help, already mentioned, was rigidity of equipment and the inherent ability of ceramics to stand up at high sfpm. By increasing speed a lighter tooth load was introduced even with the increased feed rate.

Corner angle geometry is especially important when using cemented materials, and particularly so when hot pressed ceramic elements are used. By the use of a corner angle, chip thickness is reduced by the cosine of that angle. This reduction of thickness offers, at the same time, a greater chip length, therefore providing the same metal removal rate. But, it brings about a significant reduction in cutting pressure at the tool edge and destructive forces are considerably less. Another plus from the addition of the corner angle is that the cutter is introduced to the work more gradually.

end

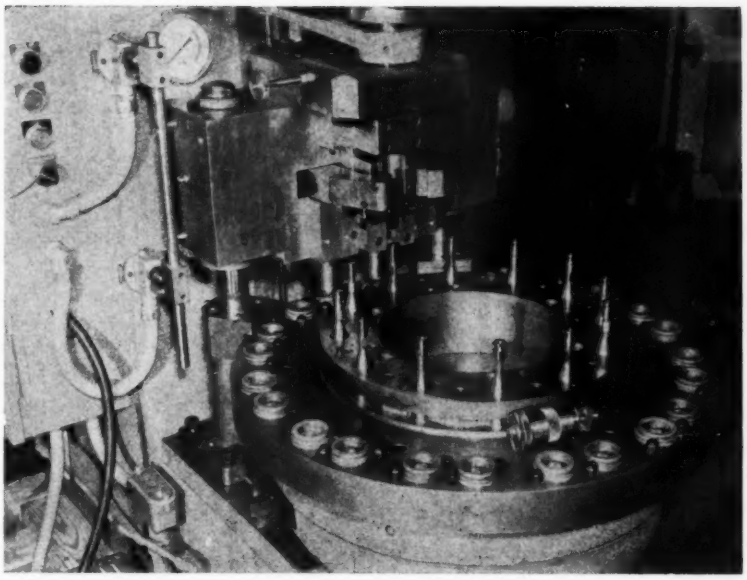


Fig. 1. Broaching dies are mounted on this steel dial. Work fixture rests on dial in the foreground. Holes around the outer rim are for guide pins.

Progressive Blind Hole Broaching On A Press

UNIQUELY TOOLED hydraulic Multipresses are producing complicated parts by progressive blind bottom broaching. The former production method called for open broaching of a sub-component, followed by welding of two pieces into the finished component.

The new production technique yields 60 components/hr, triple the old rate. By elimination of the subsequent welding operation, which demands pinpoint alignment, rejects have been reduced to a negligible level.

To meet production and quality criteria, Michigan Machine & Broach Co.'s tool engineers selected 5-ton C-frame Multipresses, equipped with 12-station index tables. The single press broaching job required that the piece being worked be brought down sequentially, on a progression of broaching punches. To use this technique, a dial was designed and installed on the press index table. Around the rim of the dial are the 12 broaching punches (Fig. 1). As each punch indexes into position under the workpiece in the ram station, the piece is moved down over the punch and then is moved up. The next punch then indexes into position. Approximately 0.0035" to 0.004" of metal is removed with each punch.

A thin stream of lubricant is supplied through a hole in the tip of each broaching punch. A pump, underneath the index table, pushes the lubricant through a neoprene hose inserted through a hole drilled in the table.

In operation, the part is first mounted in a collet (Fig. 2). The fixture is then inserted between the clamping jaws of the work station. The operator presses the cycle start button and the hydraulic clamp cylinder retracts, closing clamping jaws around the collet (Fig. 3). When the clamping cylinder is fully retracted, a limit switch closes the circuit to the press operating valve.

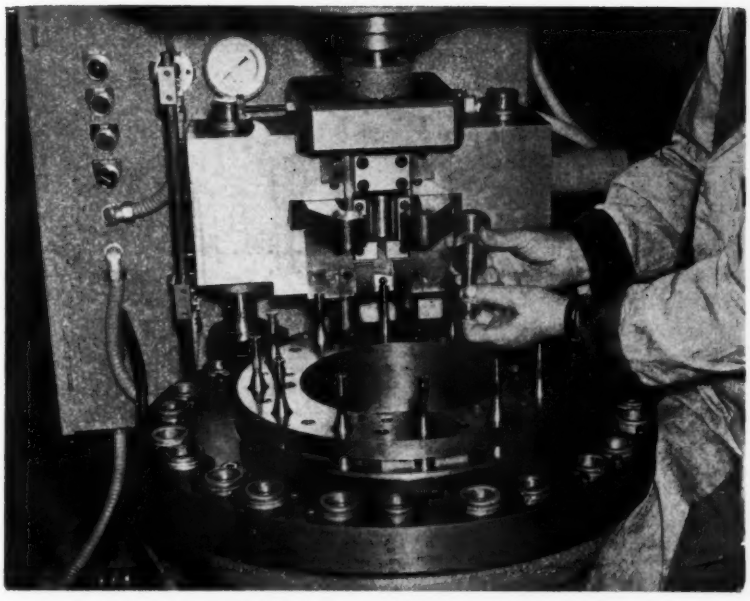


Fig. 2. Part is inserted in fixture. Guide pins are in "down" position under and behind ram station.

The index table then swings to the first work station. Guide pins move into place as the ram descends at approximately 350 psi,

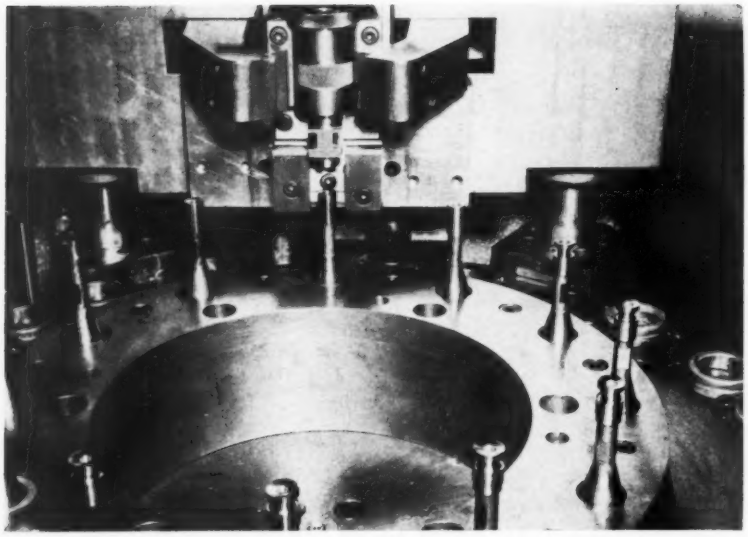


Fig. 3. Work fixture containing part to be broached has been inserted under the ram station and over the first broaching die. Hydraulically actuated clamps hold the fixture.

pushing the workpiece over the punch. Total ram stroke is 2-1/4". The ram then retracts, freeing the work from the punch. Guide pins come up, and the next broaching punch indexes into position under the ram.

After each 12-station broaching cycle, a cam trips a microswitch which automatically shuts down the press. The operator then removes the completed part from the collet, and loads a new part. The automatic shut-down prevents any error in the die-pass sequence. A complete broaching cycle requires approximately 1 min, including time required to load and unload.

The first three broaching punches broach the minor diameter of the part. Succeeding punches then begin generating the spline. The eleventh punch adds a relief spline, and the last punch sizes the final width of spline, and the major and minor diameter.

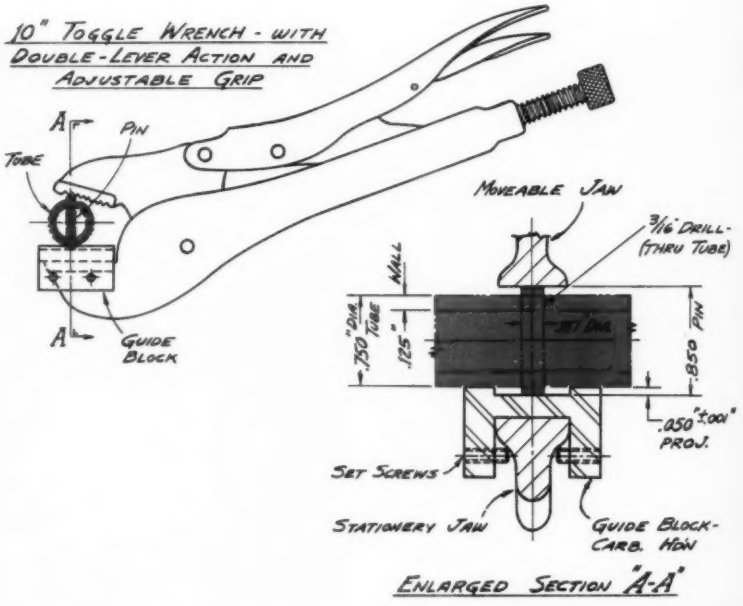
Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Road, Cleveland 18.

Gadget Solves A Pressing Problem

HERE'S A GADGET for pressing pins in a bar or tube so that they may protrude to given dimensions. It has special merit when the job is to be done on an assembly floor or in some out-of-the-way area.

A typical problem and its solution are shown in the drawings. Requirements call for an 0.187" dia pin to be set to protrude 0.050" (±0.001) from tubing. The pin is a slotted and chamfered spring pin of heat treated carbon steel. Commercially available, they are purchased to the nominal length of 7/8" and ground accurately to 0.850" (±0.001") length. The steel tubing is 0.750" on the OD with a 0.125" wall thickness.

To do the job, a 10" standard toggle wrench was selected as the basic tool. The double-lever action permits approximately one ton of force exerted by just the hand.



A special guide block was mounted on the wrench's stationary jaw and held in place by set screws. The guide block has a 0.050" deep slot. After machining, the guide block was carburized and hardened to prevent undue wear.

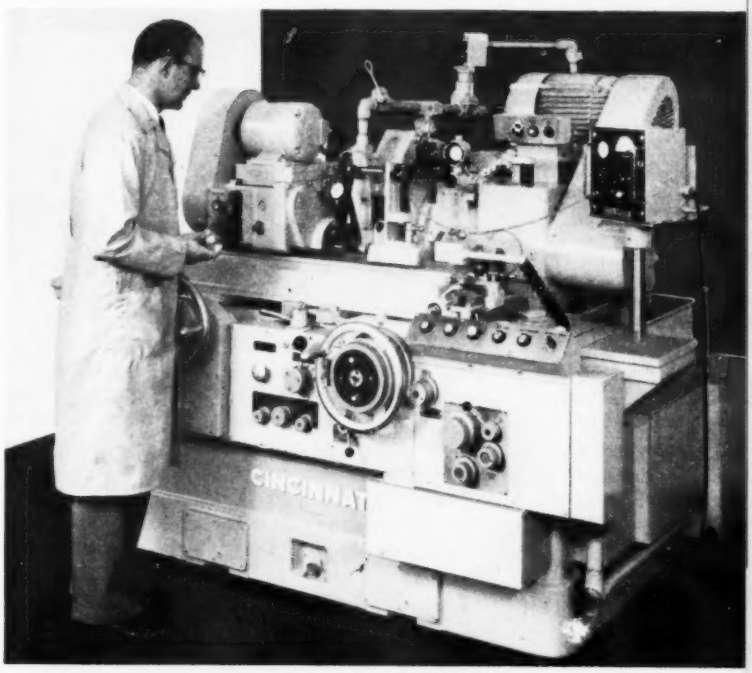
The average force required to press in the pin is 500 lbs. In a 3/4" dia solid bar approximately 1100 lbs would be required. We have pressed in several thousand pins this way, and a 10" wrench is more than adequate.

—Clement F. Brown

CINCINNATI

Compare automatic infeed systems...see why

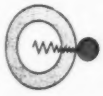
ACRASIZE CONTROL is the best



CINCINNATI FILMATIC 10"R x 18" Plain Grinding Machine equipped with the timesaving feature-advantages diagramed in the chart below. Catalogs G-688 and G-661-2.

CINCINNATI ACRASIZE is the exclusive gage control system which calls the signals for the entire automatic infeed grinding cycle. Maximum time-saving and extra high quality are attained by combining:

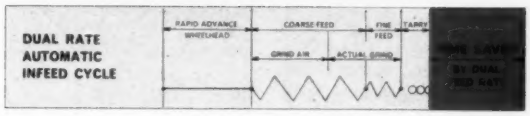
Automatic Dual Rate Infeed (lever or push-button operated) provides fast, accurate grinding cycles with dual feed rates . . . coarse feed for rapid stock removal, and a smooth, continuous fine feed to exact size. No gage required.

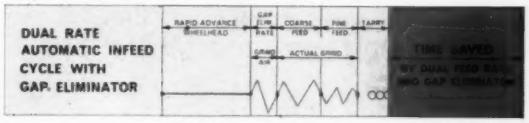


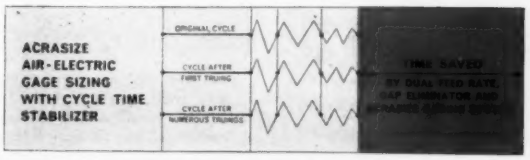
Automatic Gap Eliminator reduces infeed cycle time. This Cincinnati development saves up to 75% of the time normally wasted in grinding air.

ACRASIZE *Gaging with Cycle Time Stabilizer* completely controls the grinding cycle. Effects of machine thermal changes, wheel wear and work variations are eliminated. Cycle time always remains constant.

These three Cincinnati feature-advantages give you a basis for comparison of automatic infeed systems. Check them all and you'll see why Cincinnati produces the highest quality work at rock-bottom cost. **Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**






ACRASIZE AIR-ELECTRIC GAGE SIZING WITH CYCLE TIME STABILIZER
ORIGINAL CYCLE
CYCLE AFTER FIRST TRUING
CYCLE AFTER NUMEROUS TRUINGS

MMT-PE

Booth No. 1034

CINCINNATI®

GRINDING MACHINE DIVISION

PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • MICRO-CENTRIC • ROLL • CHUCKING • CENTERLESS LAPPING

CIRCLE INFORM-A-GRAM KEY NO. 67

Over some 50 years, Frederick W. Taylor's ASME paper, "On the Art of Cutting Metals," has become a classic. It has sparked metal cutting research into the optimum machining conditions applicable to any particular job. The principal hurdle confronting shop-wide acceptance of the many findings often has been the lengthy calculations necessary for the answers.

Last July 26 in Schenectady we attended the "unveiling" by G. E.'s Machining Development Service of their simplified approach to high efficiency (Hi-E) machining calculations — the art of getting the most production at lowest cost, or, where it is necessary, getting maximum production with cost being secondary. —E. W. P., Editor

THE TOOLS OF THE trade or physical aids to Hi-E machining calculations, consist of two styles of simple worksheet, a plastic slide rule type of calculator with instructions, and convenient tables of work material numbers, Brinell hardness values, and machinability ratings. Both worksheets are not involved in a given job — one style being used when working with brazed carbide tools and the other used on jobs employing disposable carbide inserts.

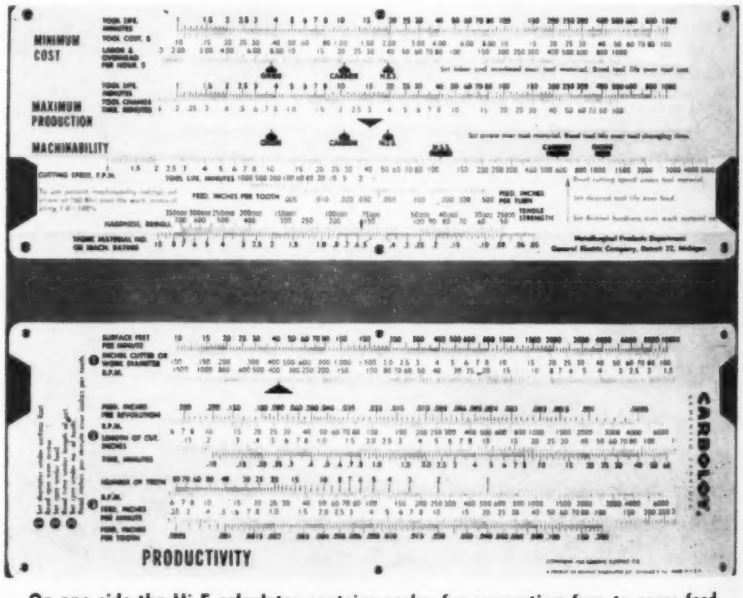
The worksheets are most ingeniously designed, so that merely filling them in sets up, in self evident fashion, the simple multiplications, additions, and divisions necessary to arrive at (a) tool life for minimum part cost and (b) tool life for maximum production rate.

These values are then "fed into" the slide rule calculator in order to convert tool life to cutting speed.

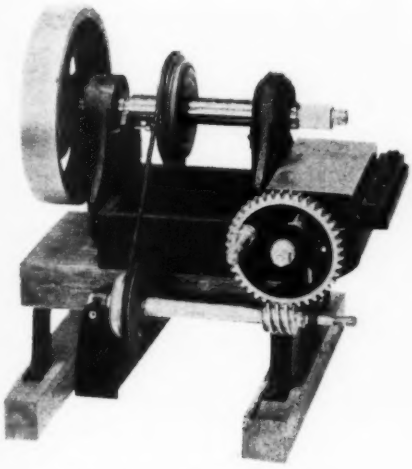
We have picked one example to show the time saving potential of G. E.'s new method of Hi-E machining calculations.

The job: rough turning railroad axle forgings. A chart was prepared, on the basis of actual production testing, to show the optimum range of machining by cut and try. The chart required approximately two months to complete — 100 hrs a month, 200 hrs total. This time, costing at least $10/hr in labor and overhead, meant a total cost of $2000 before actual results were available.

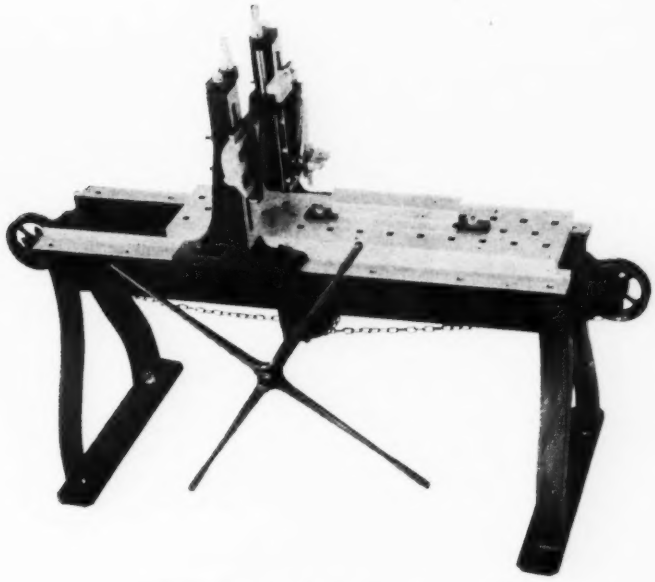
On the same job, applying the new Hi-E method, by virtue of the self-calculating work sheet and pocket slide rule, gave essentially the same results and took exactly 10 min. Multiply this by the number of times Hi-E could be computed for other applications throughout a shop and you have what adds up to sizable savings. Savings in the computation, and savings in employing the Hi-E results. end



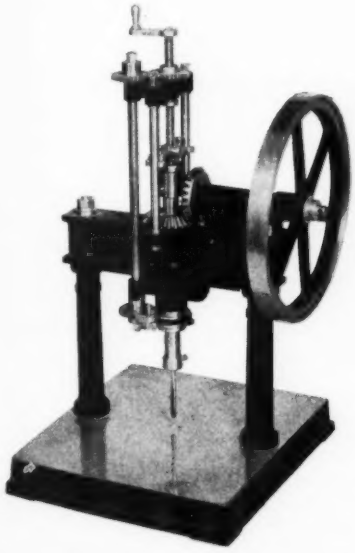
On one side the Hi-E calculator contains scales for converting fpm to rpm; feed and rpm to cutting time; and feed per minute to feed per tooth on multiple tooth operations. On the other side, the calculator has scales designed to determine desired tool life and to convert tool life to cutting speeds.



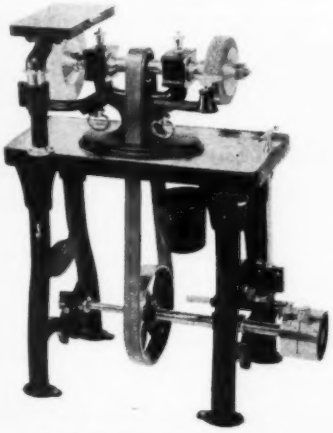
The first milling machine, invented by Eli Whitney.



First power feed drill press, vintage 1840.



Metal planer of 1817.



Surface grinding in 1873.

Previewing the

Chicago Shows

SHOWTIME IN CHICAGO will find production men in the midst of acres of modern machine tools and accessories that are a far cry from their "primitive" predecessors pictured on this page. Part of the historical exhibit in DoAll Co.'s Hall of Progress, these antique machine tools are a reminder of the great strides made by metal-working in the past century.

Although innovations leading to greater production efficiency are expected in a competitive industry, visitors to the three Chicago Shows will be impressed with the greatly accelerated pace of metalworking progress in the five years that have elapsed since the last shows. Increased output, greater accuracy and reliability, more versatility, and automatic control are features of the new equipment designed for economical production.

Tooling & Production previews of show attractions, started in the August issue, are continued this month on the pages that follow. Each item is provided with an In-form-A-Gram number to facilitate reader inquiries.

Now turn the page for capsule descriptions of 1960's machine tool designs.

Show Facts

Machine Tool Exposition-1960
Chicago's International Amphitheatre
43rd and Halsted Sts.
Sept. 6-16, 10 a.m. to 5:30 p.m.

Production Engineering Show
Chicago's Navy Pier
Grand Ave. and Lake Michigan
Sept. 6-16, 1 p.m. to 10 p.m.

2nd International Coliseum Machinery Show
Chicago's Coliseum
1513 S. Wabash Ave.
Sept. 7-15, 1 p.m. to 10 p.m.

All three shows are closed Sunday, September 11.

From the Cover:

Layout Drilling Machine With Tape and Dial Input

THE EDLUND-MATIC — a layout drilling machine with numerical control having both tape and dial input — was designed to provide flexibility and speed in setting up a wide variety of operations. Provision is made for nine tool changes and operations, with the operator having the option of using any speed or feed within the range of the machine.

Setup time is reduced to a fraction, and expensive jigs and fixtures are eliminated by the automatic programming of a workpiece under the master drilling spindle, according to Edlund.

Initial setups, such as speeds and feeds, are made through knobs. They're constantly indicated on direct-reading dials. All stops controlling rapid advance and feed travels are instantly available to the setup man at his normal operating position.

At the machine setup control panel, the setup man or operator moves the manual operation selector knob to #1 of the operation positions. At this point he sets the speed and feed, watching each instrument dial to confirm the setting position. He continues to make similar speed and feed setups, as many as desired, by changing the selector knobs.

He then turns the selector switch back to #1 and, at the machine, proceeds to set the rapid traverse and depth feed stops for the particular operations. All nine pairs of stops may be set ahead, or when the first piece is machined.

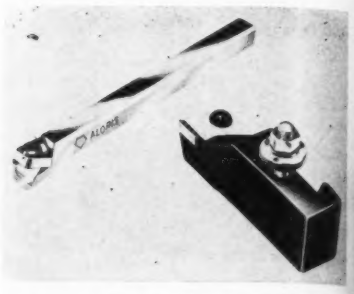
After the setup has been made and a part is in place on the compound table, the operator places a previously prepared tape in the numerical tape reader, and presses a "Cycle Start" button in the pendant pushbutton station or at the operator's control station. The table will then move to the command position and, upon arriving at that position, will initiate the spindle feed cycle.

If other operations using the same tool and depth settings are desired, the table will continue to position as commanded. When the tape calls for a new operation involving a new tool and different depth control settings, with their corresponding speed and feed changes, a light will appear, designating the number of the tool that the operator is to place in the spindle. The speed and feed changes will automatically be made. The spindle will automatically stop for the operator to change tools. The operator will again press the "Cycle Start" button and the table will re-position to the new command, setting up the machine cycle once again.

Capacity of the Edlund-Matic is 1" in cast iron and ⅞" in mild steel. The spindle nose has a #5 male Jacobs taper with a draw type screw for locking the toolholder in place. The spindle travel is 7"; sliding arm travel 10". Spindle quill diameter is 3-1/16". Spindle speeds are infinitely variable within the standard speed range of 225-2700 rpm. Spindle feeds are 1 to 7 ipm. Absolute accuracy of the table is 0.001"; repeatability, 0.0002".

The Edlund-Matic will be featured at Edlund's Booth 531 of the Machine Tool Exposition. For details, Circle No. D1.

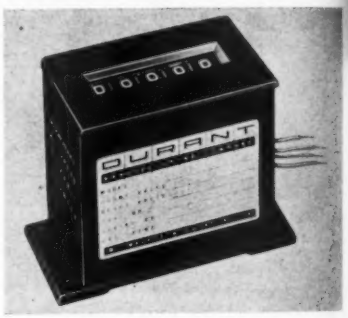
Tool Posts and Holders



At the Production Engineering Show Booth 470, Aloris Tool Co., Inc. will exhibit quick change tool posts and holders, under power. A complete new line of boring bars for triangular carbide insert will be featured. Available in six sizes from 5/8" to 2½" for accommodating standard triangular carbide inserts, they're made from heat treated alloy steel.

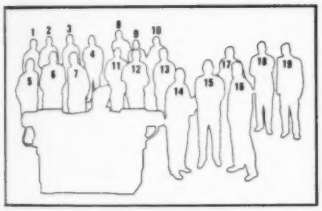
Also added to the Aloris line is a new profiling holder for carbide inserts, giving a 32° clearance for plunge cutting. For details, get the 1960 catalog by Circling Inform-A-Gram No. S1.

Electric Counters



The Durant YE electric counter that resets to zero either electrically or with a flick of the finger and counts up to 1500 cpm, will be shown at Booth 302 of the Production Engineering Show by Durant Mfg. Co. Refinements in design include a new high speed drive internal mechanism that allows it to run accurately and dependably over 1500 cpm. It's used with electric computers, card and check sorters, remote control counting instruments, and for light production machines. See it at the show, or Circle Inform-A-Gram No. S2.

See You in Chicago!



1 C J Hanrahan, asst. supt.
2 D A Piper, product engineer
3 W Szacik, eng. supervisor
4 J N McHoul, sales engineer
5 E J Patria, superintendent
6 C R Adams, chief sales engineer
7 H J Gaseau, sales engineer
8 R D Swahnberg, sales engineer
9 J R Jarest, asst. chief eng.
10 H N Langley, applications eng.
11 R R Grover, development eng.
12 C B Clark, chief engineer
13 A F Anctil, eng. supervisor
14 R B Vaughan, sales manager
15 G Swahnberg, president
16 E J Kingsbury, chairman
17 E R Guilbeault, mach. operator
18 H M Frechette, v. p. & gen. mgr.
19 E J Kingsbury Jr, v. p. & treas.

not shown in photo
N J Stankiewicz, service mgr.
A H Knight, sales engineer
C E Loos, electrical engineer
C O Snow, asst. to the supt.

3 Automatic Indexing Machines Show How to Combine a Variety of Operations

Here in booth 731 of the Amphitheatre is equipment that is unexcelled for high production drilling and tapping work to close tolerances. Here too are attachments for performing a variety of operations in the same chucking of the work.

All of us plan to be here (but don't worry, not all at once). And we want to show you . . .

— 3 automatic indexing machines

— 8 different models of automatic drilling and tapping units

— 11 different head attachments for a variety of operations — boring, milling, recessing, oscillating, angular feed, speeder, planetary speed reducer, etc.

— other accessories — two-position hydraulic slide, coolant distributor, bushing carrier, etc.

Left — a fairly simple setup with 20-inch index table and three automatic drilling and tapping units.

Rear — a large setup with 63-inch index table and a center column that supports ten units. Seven units are mounted on wing bases. Suitable for many operations.

Right — a new basic machine with 40-inch index table and no center column. This new addition fits into our line between the other two types.

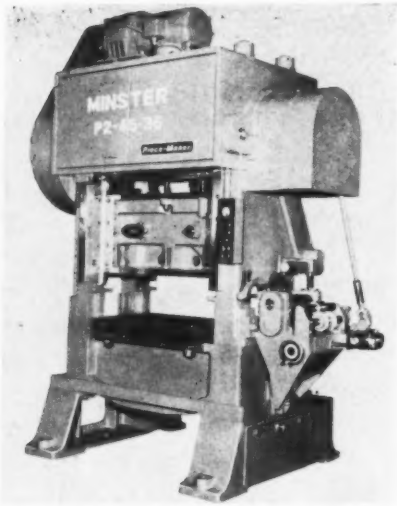
These machines have no special tooling, but we will be glad to talk to you about designing, building and tooling a machine all ready to produce for you.

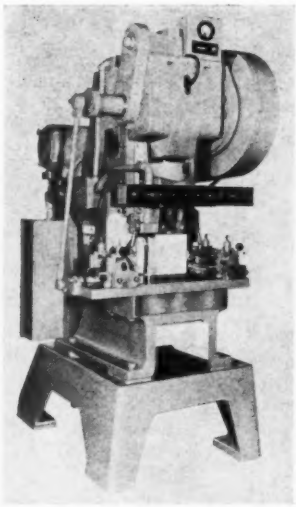
See you in Chicago! Kingsbury Machine Tool Corp., Keene, N. H.

KINGSBURY

CIRCLE INFORM-A-GRAM KEY NO. 71

Presses for Varied and Variable Speed Jobs

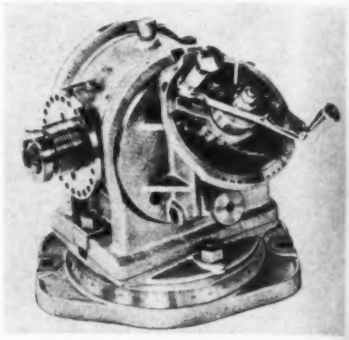




Precision built for progressive die operations at high speeds, the Minster automatic P2-45 Piece-Maker two-point straight-side presses feature exceptional slide guiding and slide to bed parallelism. A single roll feed with bell crank drive allows micro-adjustment of feed length while press and feed are active.

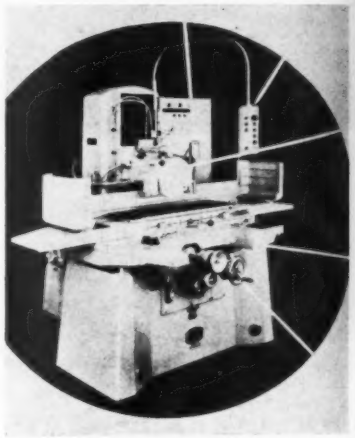
Stop at Booth 1339 at the Machine Tool Exposition to see the Piece-Maker and Minster's new B1 flywheel high-speed gap presses (16 to 60 tons) which feature a new fixed base design for the stability needed in high speed automatic operations. Variable speeds range from 400 to 800 spm. A double-geared twin-drive press and OBI presses will also be shown. Get details by Circling No. S3.

Machine Tool Accessories



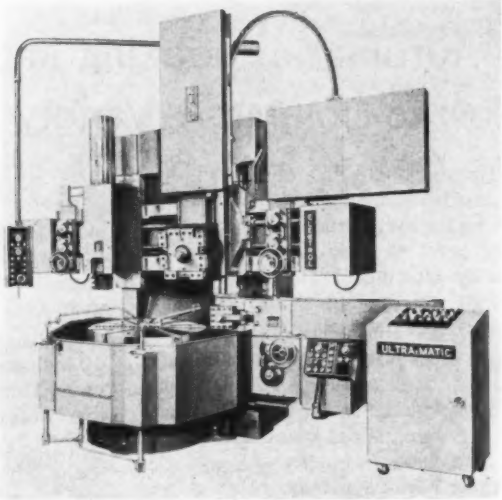
At Booth 503 at the Production Engineering Show, precision machine tool accessories will be shown by Nichols-Morris Corp. The 10" Model E universal dividing head (illust.) is a rugged heavy-duty type, equipped with the floating index plate which provides a wider range of divisions and greatly facilitates setup. Work can be held between centers, in chucks, or in collets. Circle Inform-A-Gram No. S5.

Horizontal Surface Grinder



At the Coliseum Machinery Show, Hermes Machine Tool Co., Inc., will show a line of grinders, drills, and lathes. Model HFS 9 hydraulic horizontal surface grinder (illust.) has a 12 x 36 capacity and features oil bearing spindle, a two-speed 7½ hp motor built as a single unit with the spindle, and table and cross slide guided by ball bearings which run on hardened, ground, and lapped replaceable steel ways. For information, stop at the booth, or Circle Inform-A-Gram No. S6.

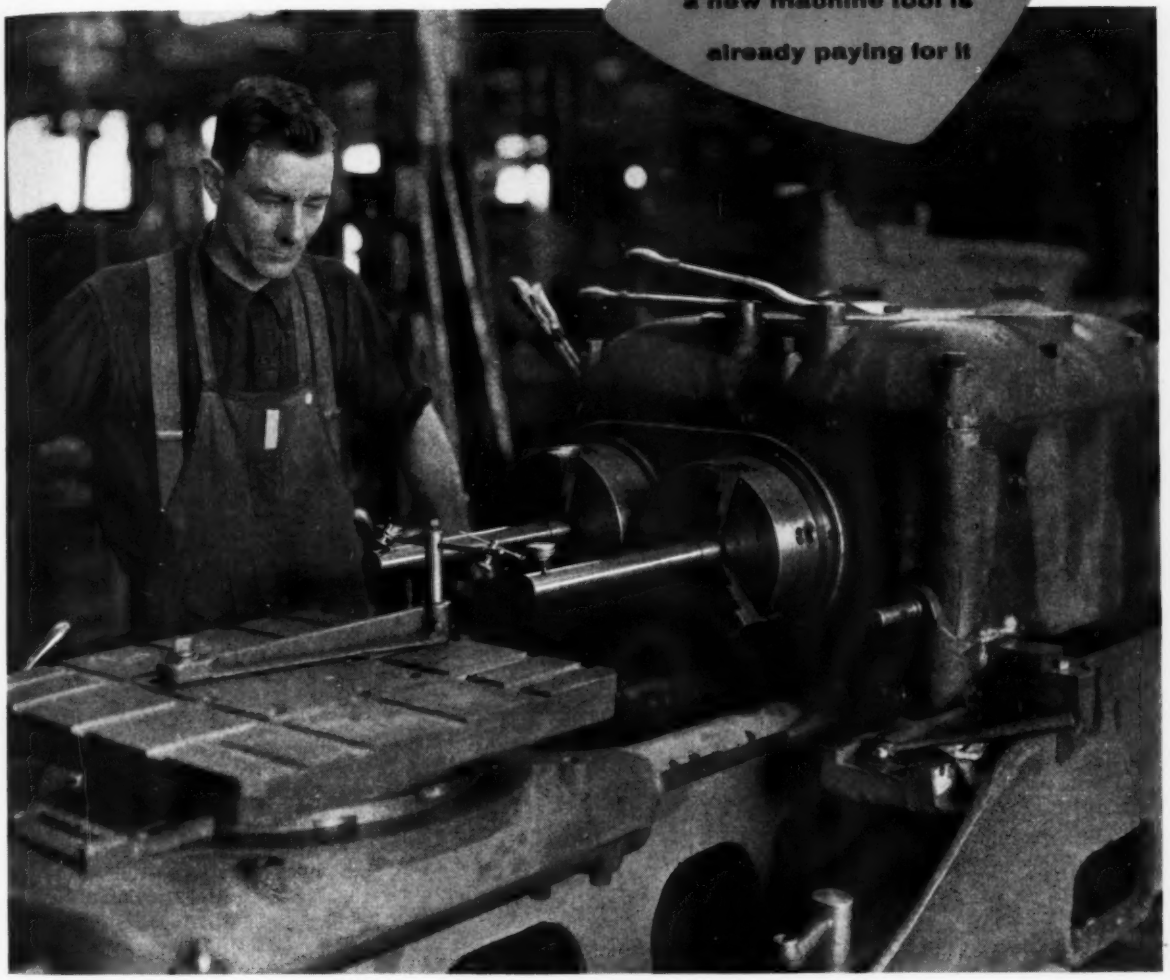
Automatic Boring Mill



Cost-reducing productivity in boring mill operations and hydraulic press applications is the theme of American Steel Foundries Elmes/King Div'n at Booth 1406 of the Machine Tool Exposition. Some of the 13 machines will be in operation. Pictured is the 46" King Ultramatic vertical boring and turning machine featuring the Ultramatic programming device which provides complete automatic control of the full cycle of machining operations. Small size presses, C-frame presses, and bending and forming machines will be shown, too. Circle No. S4.

JONES & LAMSON MACHINE TOOLS

the man who needs a new machine tool is already paying for it



It's Useful . . . but is it still Profitable?

Provide competent people with the proper equipment, and you have the key to sustaining a sound, healthy business condition.

Incompetence in people is detected sooner than later, and they are replaced. It's the value of the equipment that fools most of us. Just because a machine still runs, possibly as well as when new, it's generally considered as useful. But it's not *usefulness* that brings home the bacon — it's *profitableness*.

New, improved methods, and the machines to implement these methods, are being created constantly. If your methods and equipment do not stay abreast of competition, at the least, you inevitably will be out-produced, out-priced, and out of business.

Most of the really good new machine tools now available to industry will pay for themselves in a short time, and will roll up profits besides. We think this is true for some other makes of machines — and we *know* it is true for each and every item in the complete line of Jones & Lamson equipment.

J & L machines are easier to acquire than you may think, too.

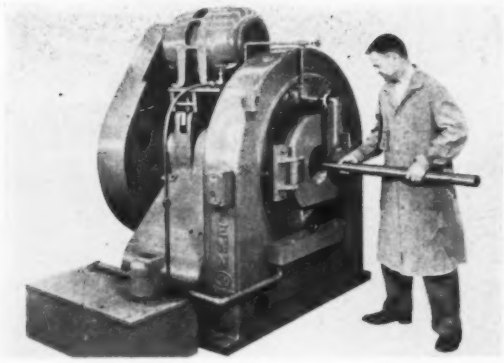
Investigate the new J & L Profitivity Lease Plan. It requires no money down, no advance payments — in fact, no payments of any kind are required until thirty days after the machine has been shipped.

Write to Jones & Lamson Machine Company, 519 Clinton Street, Springfield, Vt. for Machine Replacement and payment plans.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

CIRCLE INFORM-A-GRAM KEY NO. 73

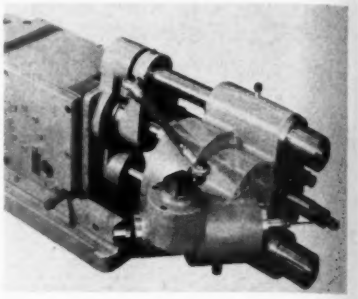
Parade of Swagers



Swaging takes the spotlight in the Fenn Mfg. Co. exhibit at Booth 515, Coliseum Machinery Show. The company will exhibit its complete line with all sizes on display and operative. One of the larger sizes is the Model 7F, shown, tooled for tube pointing. This unit has a capacity for tubing up to 5½" and solids up to 2¾". For details Circle No. S7.

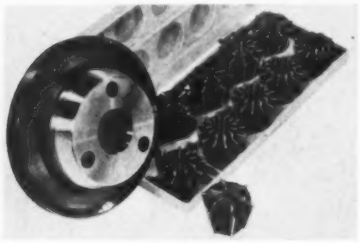
Drill Head on Display

This angular feed drill head for operations at a fixed angle has an angular drill bushing that feeds forward into a large hole. The quill feeds the head forward until it hits a stop. As the quill continues to feed it causes the tool in the head to feed forward in the bushing. Other drilling and boring heads, along with three automatic drilling and tapping machines, will be introduced by Kingsbury Machine Tool Corp. at Booth 731, Machine Tool Exposition. For more information Circle Inform-A-Gram No. S9.

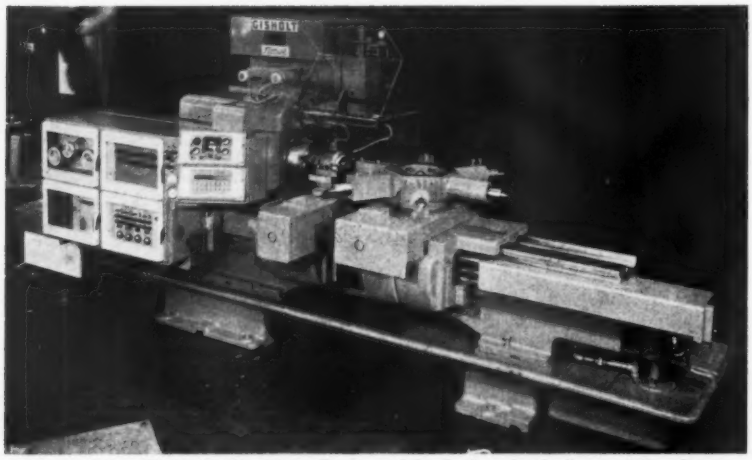


Check These Chucks

This new collet chuck for lathes has a nose-type closure, Rubber-Flex collets, and a one-piece, high impact handwheel featuring a phenolic molding with a steel insert. Designed to replace chucks using split steel collets, the Model 50 offers faster collet changing, capacity increases up to 42%, run-out of less than 0.001" at the nose, and a range of 0.001". See it and other Jacobs Mfg. Co. chucks at the Machine Tool Exposition, or Circle Inform-A-Gram No. S8.

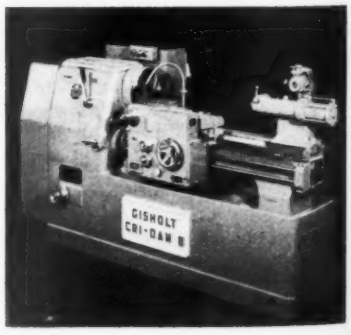


Tape Controlled Turret Lathe Line



Star of the Gisholt Machine Co.'s Booth 1042 at the Machine Tool Exposition will be the new Factrol 101 turret lathe with continuous path magnetic tape control. Combining the Factrol with a tape recorder, an operator will be able to make his own tapes after less than a day's instruction. Advantages of this lathe include quick change-over, one set of tools to handle a wide range of work, simultaneous control of both hex turret and square turret tools, and elimination of extra tools and turret stations tied up to handle angles, chamfers, radii, etc. Ram type, saddle type, and automatic chucking turret lathes will also be shown. For information, Circle Inform-A-Gram No. V1.

At Booth 518 of the Coliseum Machinery Show, Gisholt will show the Cri-Dan line of single-point automatic threading lathes. The Model B will demonstrate how single- or multiple-start, coarse or fine, left- or right-hand, parallel or tapered threads can be cut, right up to shoulders, on all types of internal and external threading operations. For details, Circle Inform-A-Gram No. S10.



JONES & LAMSON
"AUTOMATION"

the man who needs
a new machine tool is
already paying for it

New numerically-controlled turret lathe shatters idle time . . . is ideal for short runs

At the last Machine Tool Exposition, five years ago, Jones & Lamson exhibited an automatic tape-controlled turret lathe. It created a sensation and attracted thousands of fascinated spectators. Many of them wanted to buy. But the machine wasn't for sale. Why? Because there were still "bugs" in it to be ironed out, and our reputation is too valuable to risk on an "almost" product.

In the five years since, J & L still kept this lathe off the market, pending its complete development and proving-out. Now, it is ready to be shown, ready to be sold, ready to help you attain new production efficiency.

The new J & L numerically-controlled turret lathe is a complete redesign job. The sound features of the early prototype have been retained, and all question marks have been eliminated. In every way, this is a real beauty!

It's designed especially for short run production and top economy. It has the capacity of a No. 5 machine, 2½ x 24 in., and has three turrets (one hexagon and two square) which accept up to 14 preset tools. A set of tools plus the tape can be "packaged", ready for set-up when needed.

This lathe can be set up as either a bar machine or a chucker, in 10 to 15 min. It positions within .001″, repeats to .0005″. Drive motor is 30 HP, with spindle speeds of 40 to 2000 rpm in 24 steps. Feed rates for carriage and saddle are .750″ to 30.0″ per minute in 16 steps, plus fast motion. Cross-slide operates at one-half these rates. Tape input information may be adjusted for extended tool life and size control by manual dials on the control panel. Productivity is increased 25 to 30% over standard cycle time. Even the automatic bar feed is programmed from the tape. See it at Chicago, or write for advance information now. Jones & Lamson Machine Company, 519 Clinton Street, Springfield, Vermont.

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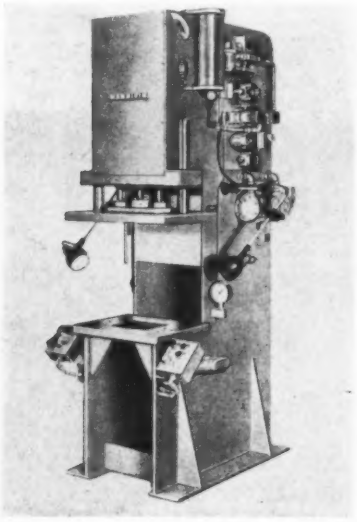
CIRCLE INFORM-A-GRAM KEY NO. 75

Hydraulic Press Operation



High speed hydraulic assembly and trimming presses will be introduced by Hannifin Co. at Booth 652 at the Machine Tool Exposition. One production press will be used in the press fit assembly of back-up washers on leak-proof straight thread fittings to demonstrate how increased productivity per hour results in reduced labor costs.

Another press (illust.) will demonstrate trimming of die cast parts at unusually high speeds. For information on these presses and punching and riveting equipment. Circle Inform-A-Gram No. S11.

Two-D Inspection

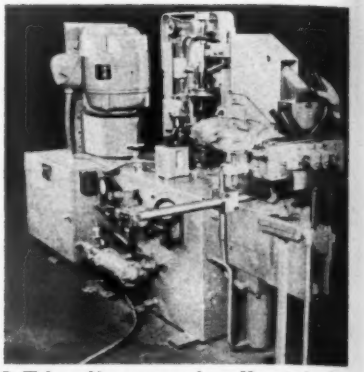
A new concept of two dimensional inspection will be introduced by The Bendix Corp.'s Industrial Controls Section at the Production Engineering Show. The Ferranti FI-22 coordinate inspection machine is a compact solid state unit which can read out hole center locations in two axes simultaneously to an accuracy of 0.001". It's capable of checking complex

workpieces up to ten times faster than conventional inspection equipment.

See also the DynaPath-20 Series numerical control units and tape controlled positioning units. For details, write the company, or Circle Inform-A-Gram No. S12.

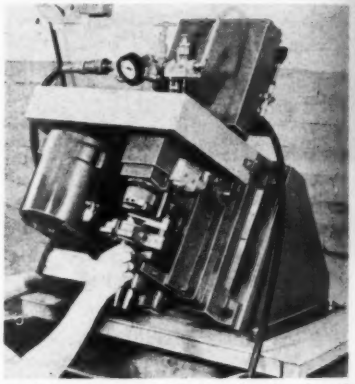
Bending Equipment

New bending machines, methods, and techniques providing 7-way savings will be featured by the Pines Engineering Co., Inc., at Booth 266-68 at the Production Engineering Show. The new Model



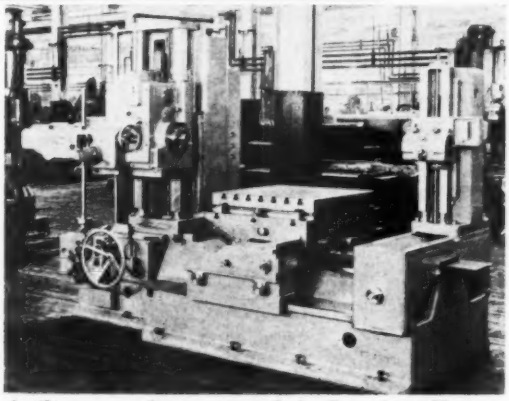
5-T bending press handles tubular or certain structural shaped stock. When processing two tubes at once, this model is rated at 900 sph or 1800 bends/hr. Circle Inform-A-Gram No. S14.

Faster simultaneous deburring, facing, and chamfering operations



will be seen on their standard and air-operated versions of the Model 660 end finishing machine. The automatic air operation and foot control frees both of the operator's hands and permits production speeds up to 1500 ends/hr. Circle Inform-A-Gram No. S15.

Precision Machine Tools



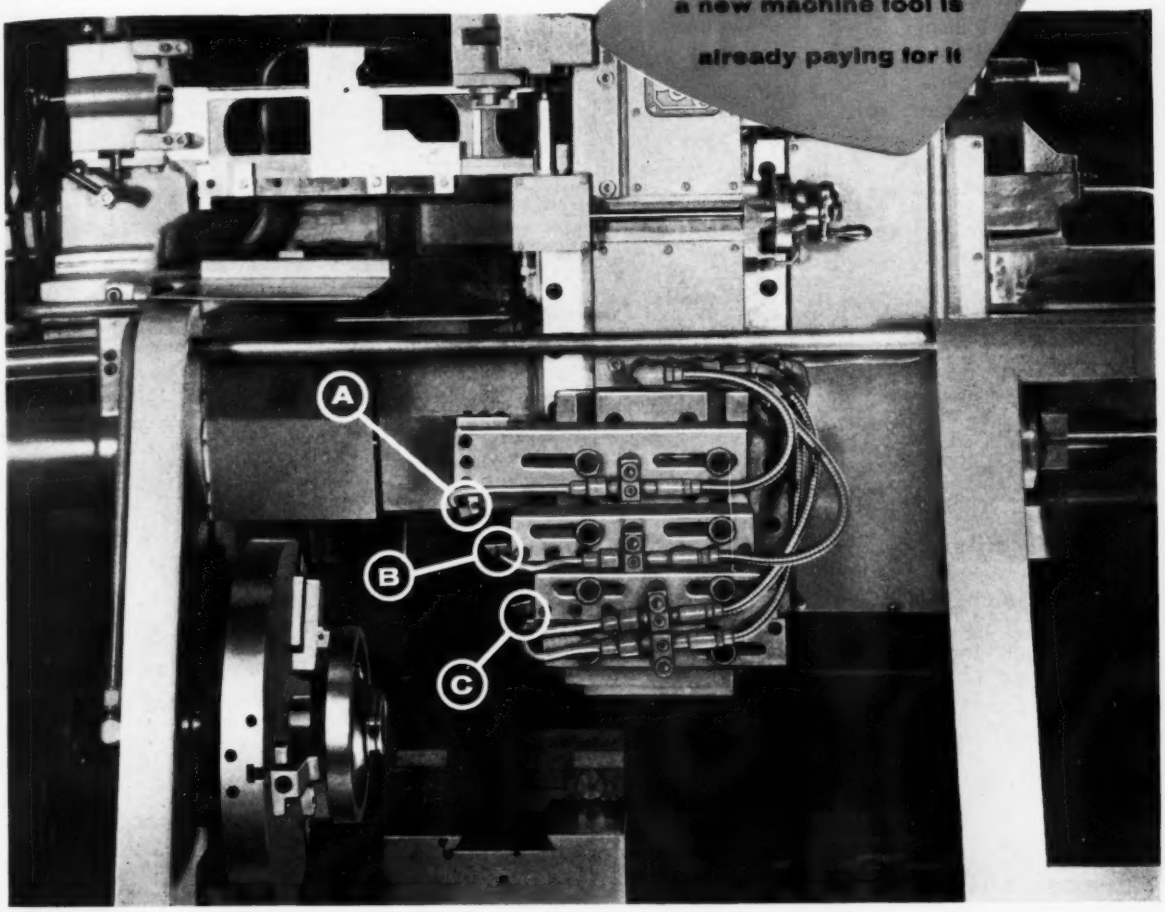
An exhibit of British-built precision machine tools will be producing production parts at very fine tolerances at Laponite Machine Co.'s booth at the Coliseum Machinery Show. Among this group of general and special purpose machine tools that will be demonstrated is Lapointe-Kearns Model 450B optimetric horizontal toolroom boring machine (illust.); an 18" super shaper; cylindrical, internal, and surface grinders; and engine and turret lathes. For details, Circle Inform-A-Gram No. S13.

Carbide Application Exhibit

New products and cost saving applications of carbide for cutting tools, dies, and wear parts will be featured in the Adamas Carbide Corp. exhibit at the Production Engineering Show. For details, Circle Inform-A-Gram No. S16.

JONES & LAMSON
MACHINE COMPANY

the man who needs
a new machine tool is
already paying for it



Multiple Tool for a Fully Automatic Two-Dimensional Tracing Cycle

The two-dimensional tracing slide on the new Jones & Lamson Model 30 Automatic Tracing Lathe provides a new opportunity for multiple tooling on tracing operations. In addition, this slide offers eight different tracing cycles for tool motion — each of which controls tool travel through a full 180° of motion.

Automatic speed and feed changes during a cut allow for the proper cutting speeds on varying diameters, resulting in longer tool life, better cycle time, and desired surface finish. *For Example:* The illustration above shows the machine as it is tooled up for one of a variety of sizes of gear blanks. Three tools on the tracing slide machine the various surfaces of the blank in one completely automatic cycle. Tool "A" approaches the work first. It chamfers and turns the O.D. At the end of the turn, tool "C" is in position to chamfer and face the contour of the hub. As this is completed, tool "B" faces the piece, contours the large radius at the flange and faces the flat surface at the face of the gear blank O.D. Automatic speed and feed changes may occur as each tool is engaged.

Multiple tooling of tracing operations not only shortens tracing cycles, but also offers the opportunity for proper tool geometry for each particular phase of the operation. Set-up from one job to another is accomplished in a matter of minutes by graduated dog rings on the conveniently located control drum.

You can see this machine in operation at the NMTBA Exposition, Booth #839, in Chicago. Or you can get detailed information now by writing for Catalog No. LO-6011. Jones & Lamson Machine Company, 519 Clinton Street, Springfield, Vermont.

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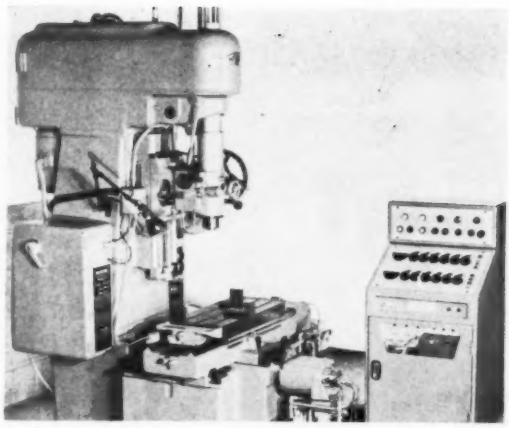
CIRCLE INFORM-A-GRAM KEY NO. 77

Compact Tape Control Unit

Numerical control of machine tools is provided by this new transistorized Inductosyn system. Punched tape input is used for automatic operation, or the system can be operated by manual input from rotary switch controls. Shown here is a jig boring application, the compact system is simple to operate and easy to maintain.



New all-metal positioning elements and other control components will also be demonstrated by Farrand Controls, Inc. in Booth 103, Production Engineering Show. For details, Circle Inform-A-Gram No. S17.

Seal Protects Tool Post

A new O-ring seal for the Enco turret tool post prevents dust, dirt, and small chips from entering the mechanism from the bottom, allowing accuracy of 0.0005". A heavy equalizer spring keeps the tool block in contact with a washer which prevents chips or dirt from entering at the top. The O-ring is

retained in a ring groove in the base of the center post and makes external contact with an accurately machined recess in the tool block.

The improved tool post and a new Mirco-Set adjustable center will be displayed by Enco Mfg. Co., Booth 468, Production Engineering Show. Circle No. S20.

Modern Radial Drills

Highlights of Morris Machine Tool Co.'s Booth 1445 at the Machine Tool Exposition include the "modern look" in radial drills and an exhibit of features on Morris custom engineered high production machines. On the Mor-Speed radial drill, external electrical conduit is eliminated and column clamp and unclamp buttons are flush mounted. It also features an improved lighting system and a new positive displacement lubrication system. For information, Circle Inform-A-Gram No. S18.

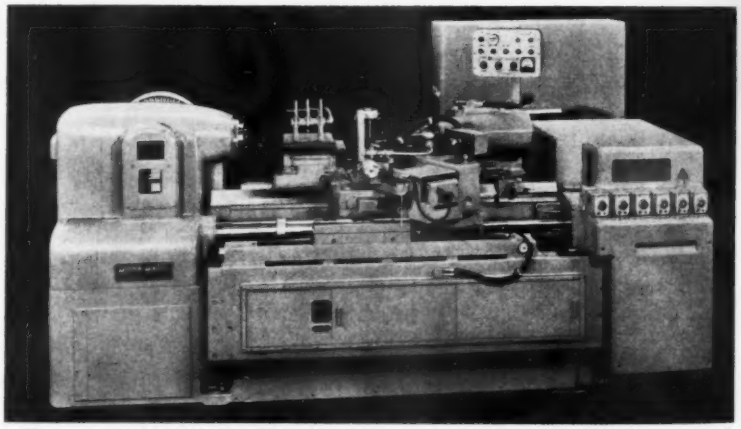
YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 100 IN THIS ISSUE.

It is for your convenience when making inquiries.

New Drill Pointers

Four new machines will be demonstrated by Oliver Instrument Co. at Booth 342, Machine Tool Exposition. Model 600 drill pointer features the Oliver point with increased clearance at the center of the drill, has a ½" to 3" capacity, and can grind two, three, and four flute drills. A Model 600 will be equipped with the Airdraulic automatic infeed. This infeed makes the operation completely automatic after set-up and is designed for customers having a predominance of large size drills to point. A standard and heavy duty drill pointer and various grinders will also be shown. For details, Circle Inform-A-Gram No. S19.

High Speed Lathe



The new Model 21-H Mona-Matic, a high speed automatic cycle lathe for heavy stock removal, features a four-cut cycle and hydraulically powered front carriage and rear slide. The Monarch air-gage tracer system, which operates on the precision air gaging principle, controls the slide from a master template. Five different feeds are available to the carriage for all cycles and three spindle speed ranges are offered.

Monarch Machine Tool Co. will also display its new 10" Model EE precision toolmaker's lathe at Booth 701, Machine Tool Exposition. For details, Circle Inform-A-Gram No. S21.

JONES & LAMSON OPTICAL COMPARATORS

the man who needs a new machine tool is already paying for it

J & L Optical Comparator is a production tool

At John Hassall, Inc., Westbury, L. I., nails, screws, rivets, fasteners, and other small parts are "Job-Designed" to satisfy the customer whose requirements cannot be adequately met by the standard item.

Rigid AN (military) specicfiations are strictly adhered to whenever required. In all cases, the Jones and Lamson Optical Comparator has become an almost indispensable production tool.

In the cold heading process used at Hassall, the J & L Comparator acts as a monitor for controlling the essentials of the production process. *Tools* for manufacture of dies are checked for proper cutting edge and angle. *The dies* themselves are checked for cavity contour and angle by taking plastic impressions. *Finished parts*, accurately magnified 10 times under the critical eye of the Comparator, are checked at a glance for tolerances. But, even more importantly, this inspection gives essential information as to when and where dies may be worn, or where other areas of the *manufacturing process* should be changed. How easy it is for production control and tolerance requirements to be maintained!

J & L Comparators, featuring magnifications up to 250X are ready to go to work for you. Write for literature. Jones & Lamson Machine Company, 519 Clinton St., Springfield, Vermont.

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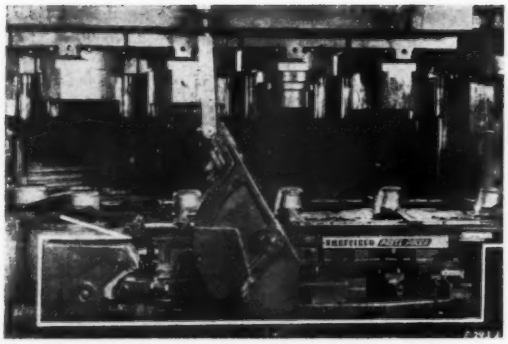
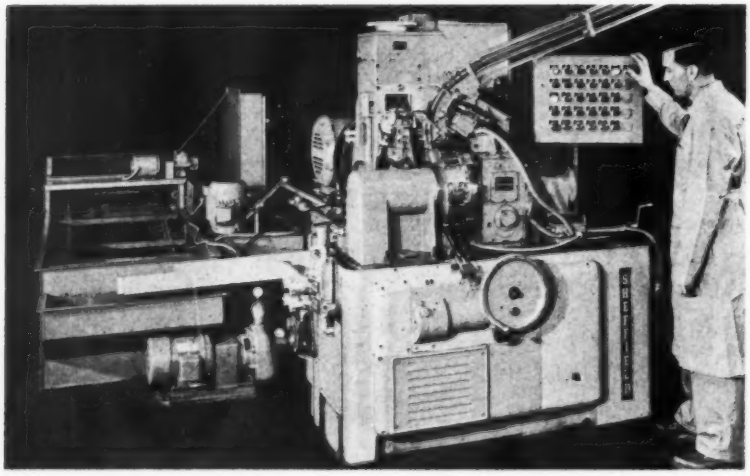
CIRCLE INFORM-A-GRAM KEY NO. 79

Inspection & Machine Tools



The Sheffield exhibit at the Machine Tool Exhibition will consist of more than 85 machine tools and inspection instruments ranging from a single plug-type gage to automatic grinding machines with built-in size controls. Featured at Booth 201 will be Model 182 Crushtrue multi-form grinding machine that automatically grinds cylindrical forms and grooves on two or four parts simultaneously at wheel speeds of 9,200 sfpm and faster. For Crushtrue details, Circle No. V2.

Besides the inspection equipment, Sheffield has a Press-pacer transfer unit for easy, low-cost conversion of standard stamping presses into a fully automated transfer line as long as 96". For information, contact the company, or Circle Inform-A-Gram No. S22.



Numerical Control Systems

A new concept in numerical control systems will be unveiled by United Aircraft Corp.'s Norden Div'n at the Production Engineering Show. The Series 100 system, shown, displays in straight decimal form the exact position of the tool or workpiece. Using one display for each axis of motion, it features illuminated numbers readable from 20 ft, individual plug-in decimal units, and a display unit which can be located on or off the machine. For details, Circle Inform-A-Gram No. V3.

The Series 600 is a completely automatic positioning system, with input from either manual dial-in switches or punched tape. Its display units provide decimal readout of actual position. Circle Inform-A-Gram No. V4.

Also on exhibit will be tape controlled inspection machines. Circle Inform-A-Gram No. S23.

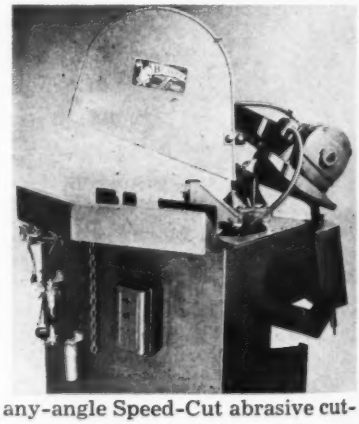
Versatile Tapping Unit

Tapping is practical in any material and at any dia from 0 through ½" with the VersaTapper. The new tapping attachment contains a 4:1 planetary gear reduction system which transmits power

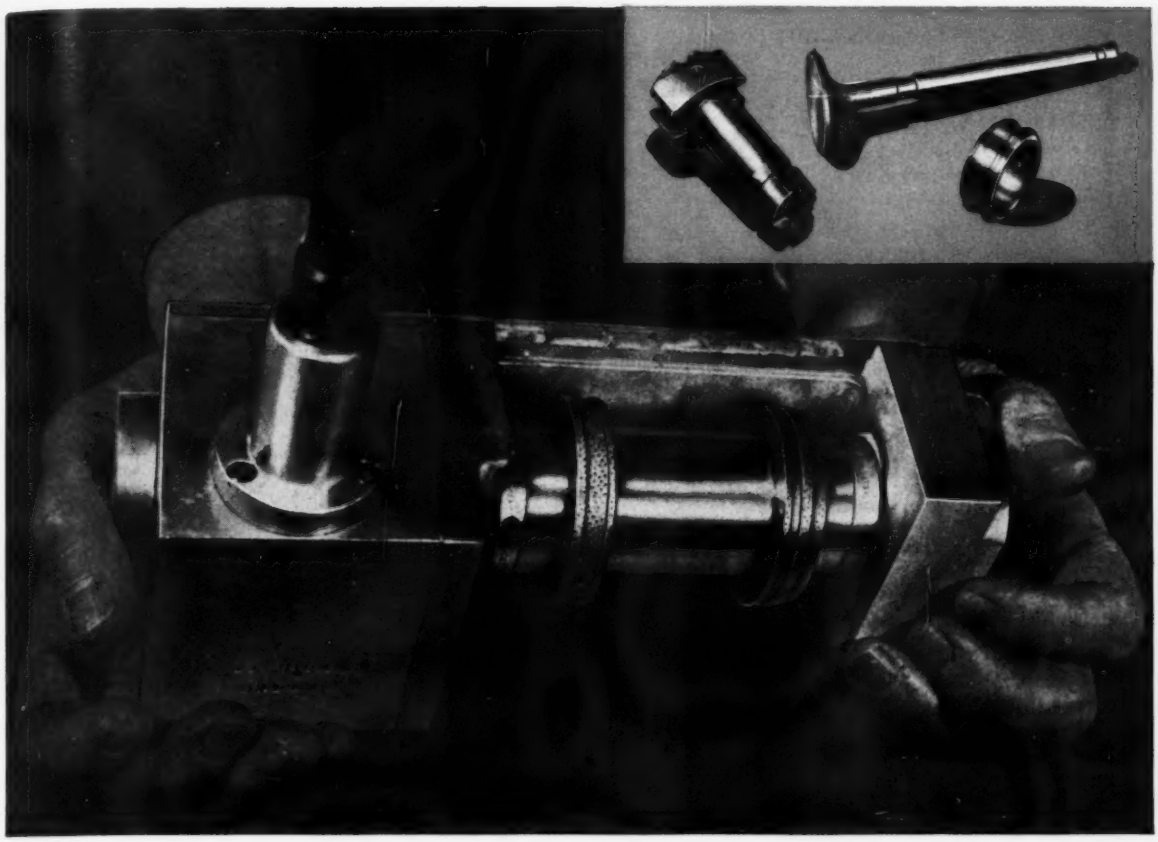
to the forward and reversing clutch members of a bevel gear train. When the thrust is down into the work the forward clutch engages. When the drill press lever is raised the reversing gear is engaged and the tap backs out easily. It will be exhibited by Supreme Products Corp. at the Production Engineering Show. For more data, Circle Inform-A-Gram No. S24.

Cutoff Machinery

The Speed-Cut Div'n of Beaver Pipe Tools, Inc. will exhibit the new line of Speed-Cut abrasive cutoff machines in Booth 141 at the Production Engineering Show. Several models, including No. 20



any-angle Speed-Cut abrasive cutoff machine (illust.), and new power head equipment will be displayed and demonstrated. This line handles shapes up to 6" and solids up to 4". Contact Beaver for details, or Circle Inform-A-Gram No. S25.



THIS TRU-GRIT® ROTARY DIAMOND DRESSING WHEEL forms grinding wheels with speed, accuracy and economy unapproached by any other method

It form dresses ANY grinding wheel—vitrified, resinoid, silicate, rubber or shellac bond. It has none of the limitations of crusher roll or single point diamond tool forming; it develops complex configurations and sharp, deep, square grooves with absolute accuracy, assuring exact reproduction in the work piece. It may do this in a single, quick pass between ejection and loading, without interrupting the production cycle. Downtime for tool changing on every shift is out; the Tru-Grit Rotary Diamond Dressing Wheel's finishing and dressing life goes far beyond anything known before. Savings in downtime, the increased number of pieces produced, the lower cost per piece over the life of the Tru-Grit Rotary Wheel are things to make cost engineers take a second look. But, perhaps the most dramatic difference of all is in the meticulous accuracy, fine finish and routine uniformity of the processed pieces. This is what quality control engineers have dreamed about and it makes quality control reports something of a formality. If you'd like facts and figures on actual applications of the Tru-Grit Rotary Diamond Dressing Wheel, write us.

WT

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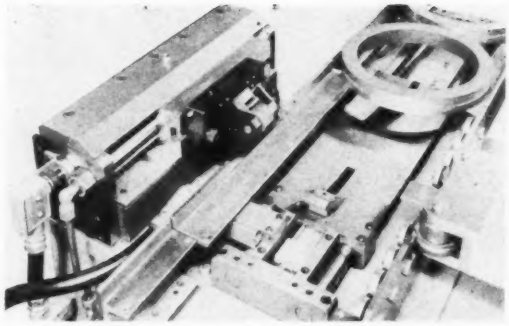
CIRCLE INFORM-A-GRAM KEY NO. 81

Hydraulic Marking Machine

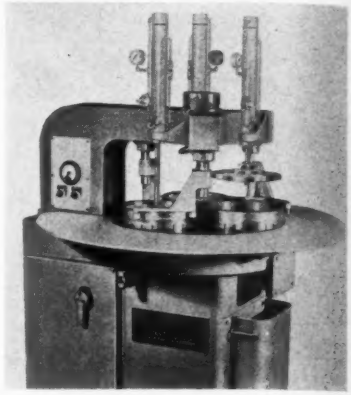
An in-line conveyor - fed production marking unit will be exhibited in Booth 233-235, Production Engineering Show, by Geo. T. Schmidt, Inc. The Model 465 hydraulic marking machine is equipped with automatic shuttle feed and a serial numbering head for marking gear blanks.



In operation, feed fingers carry parts to a retractable cradle. After positioning, the hydraulically operated die slide with numbering head rolls the legend into the periphery of the parts. The parts are then discharged to a conveyor. A 10-ton Pneumark bench press for marking up to 3600 parts/hr will also be shown. For more information, Circle Inform-A-Gram No. S26.

Redesigned Lapmaster

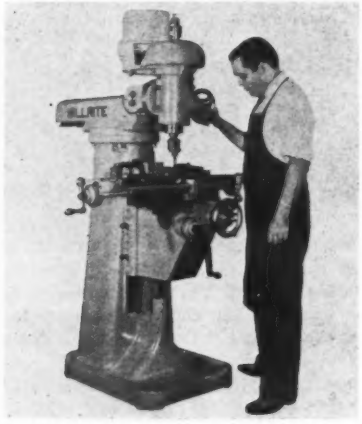
Crane Packing Co. will demonstrate its redesigned Model 24 Lapmaster lapping machine at Booth 550 at the Coliseum Machinery Show. The machine is more compact to permit efficient operation in a small space, but includes a large wrap - around adjustable work table for rapid loading and



unloading from almost any position. The machine will lap parts of almost any shape or material on a production basis, with tolerances of 1 light band and uniform 2 or 3 micro-inch finishes. A new abrasive distribution system maintains the correct mixture of compound to vehicle from initial filling to last drop. Stop at the booth for details, or Circle No. S29.

Vertical Toolroom Miller

Precision milling and boring are done on the new Millrite vertical toolroom milling machine. Equipped with a swivel head, the unit is capable of angular as well as vertical operations. A special feature is the "feather feed" of the quill, using the accuracy and smoothness of a lead screw and nut arrangement. The ram and turret machine has a 7" x 27" table with

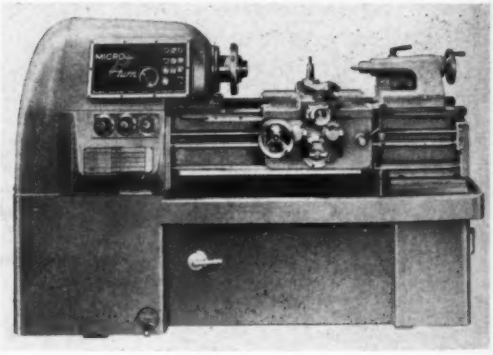


longitudinal feed of 16", crossfeed of 8", vertical feed of 15", and ram movement of 12". Also on display at U. S. Burke Machine Tool Co.'s exhibit at the Production Engineering Show will be new variations of the building block constructed Duplex Half Mill. For information, Circle Inform - A - Gram No. S27.

Bar Machines and Borers

A representative group of New Britain Machine Co.'s wide range of new machines will be shown in operation at Booth 838, Machine Tool Exposition. Included will be a Model 52 large capacity 6-spindle bar machine, a Model 18/60 copying lathe, and a Model 44 vertical precision boring machine. For details, Circle No. S28.

New Production Lathe



A new concept of high-speed, precision machining will be featured at The Nebel Machine Tool Corp. booth at the Machine Tool Exposition. Highlighted will be the new Nebel Micro-Turn lathes which offer infinitely variable spindle speeds from 43 to 3500 rpm, with exclusive new coaxial headstock design for delivery of maximum horsepower and smoothness in roughing or finishing. This lathe also features centralized pushbutton speed selection with direct-reading of speed on a tachometer and direct power transmission from main drive to spindle. Stop at the Booth, or Circle Inform-A-Gram No. S30.

IT'S A FACT!

DRILLHEADS ARE OBVIOUS.

Tremendous economies from the use of multiple-spindle drillheads are obvious. Drilling one hole at a time cannot be tolerated in this day of automation!

THOMSON

THRIFTMASTER

Drillheads
are your best Drillhead buy...

1. They are better built and cost no more (Full ball bearing construction, hardened gears, spindles and driver, and precision grinding!)
2. This means they last longer
3. This eliminates down time
4. This eliminates production losses
5. This drastically reduces drilling costs

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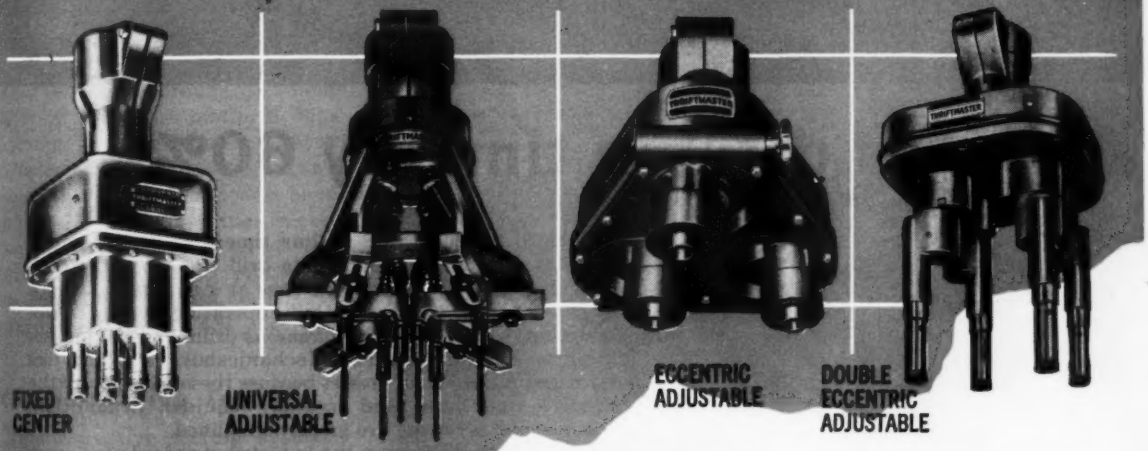
Drillheads are designed and produced by engineers whose experience **in this specific field** dates back to 1923. This long accumulation of engineering technique and production "know-how" is reflected in our product—**a quality tool... solid, substantial and dependable!**



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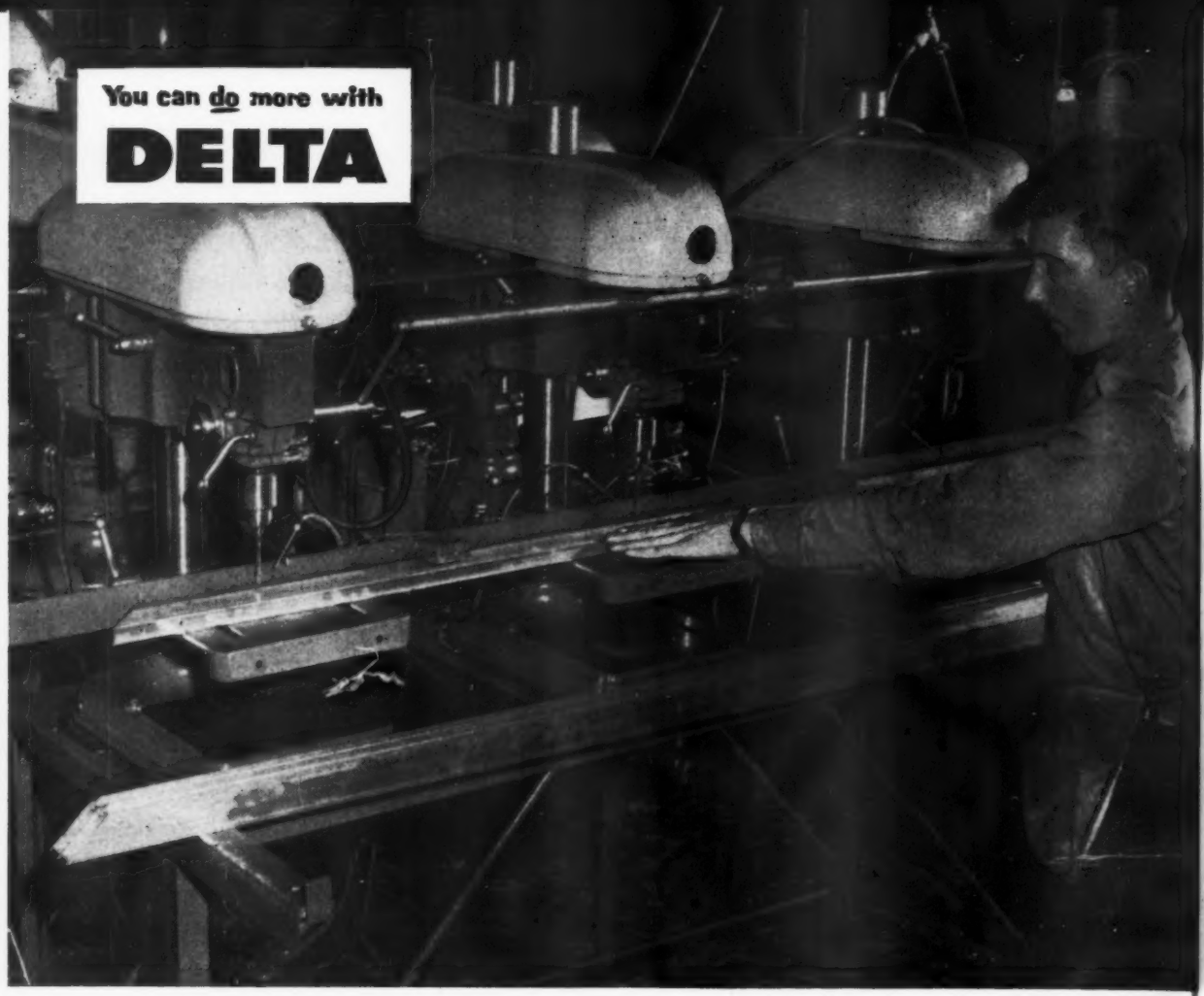
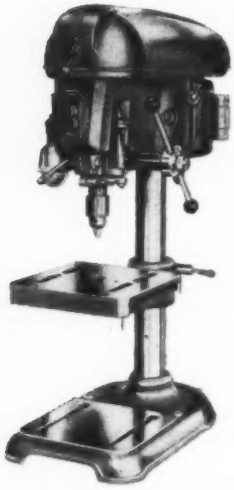
CIRCLE INFORM-A-GRAM KEY NO. 83



Cuts drilling time by 60%



Delta 15" Drill Press, also 20", 17", 14" and 14" Super-Hi Sensitive. Available in floor, bench, and multiple spindle models.

This substantial reduction in drilling time is the result of ingenuity plus a combination of Delta drill presses in two and three spindle set-ups. Spacing machines at a specified distance between holes and using bar connecting operating levers, Capitol Products Company provides *simultaneous* drilling in production of aluminum storm doors. The Mechanicsburg, Pa. firm has standardized on Delta drill presses because these tools assure the adaptability, ruggedness, and accuracy required. In addition, maintenance and servicing are greatly simplified.

Delta drill presses have set the industry standards for years —they cost less to buy, less to operate and less to maintain. Visit your Delta Industrial Distributor (listed under "TOOLS" or "MACHINERY" in the Yellow Pages)—choose the tool to fit *your* needs from the world's most complete line. For FREE Delta Industrial Catalog showing 61 machines, 302 models, over 1400 accessories, write: Rockwell Manufacturing Company, Delta Power Tool Division, 622J N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Box 420, Guelph, Ontario.

DELTA INDUSTRIAL TOOLS

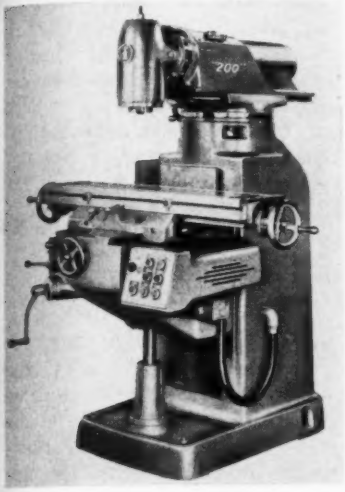
another fine product by

ROCKWELL

CIRCLE INFORM-A-GRAM KEY NO. 84

Drill Head Rotates 360°

The 360° rotation of the sliding 3′ radial arm makes it possible to move the drill head to any hole location required in a workpiece up to 6′ in diameter and over 4′ high, on the precision radial drilling machines to be shown under power by The I. O. Johansson Co. at Booth 215, Coliseum Machinery Show.



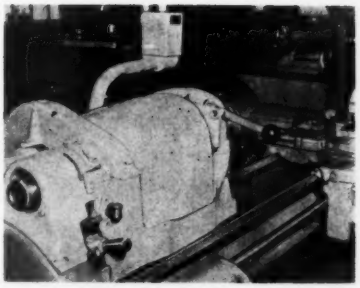
Two work stations are accessible: a 20″ x 40″ table which adjusts vertically through 16″, and 22″ x 24″ rear work platform, both utilizing accurately ground work surfaces with finished T-slots and coolant trough. Three models have up to 1-3/4″ drill capacities in cast iron and positive speeds in various ranges from 45 to 3000 rpm. Write the company for data, or Circle Inform-A-Gram No. S31.

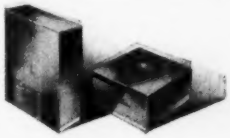
Non-Destructive Testing

Nondestructive testing systems and equipment will be featured at Booth 400 at the Production Engineering Show by Magnaflux Corp. A new portable ultrasonic thickness measuring instrument is a direct-reading unit which measures thickness of steel, brass, nickel, and other materials which transmit ultrasonic sound. Also to be shown is a unit for production testing of ferrous parts up to 24″ long, an automatic eddy current sorting instrument, and dispensers for Magnaflux and Magnaglo materials. For details, Circle No. S32.

Low-Cost Friction Spindle Lathe Brake

Featured in the South Bend Lathe exhibit, Booth 210, at the Coliseum Machinery Show will be a 16″ engine lathe, 13″ turret lathe, a vertical milling machine, 10″ bench lathe, and a pedestal grinder. The 13″ turret lathe has a new low-cost manually-operated friction spindle brake that also disconnects power to the lathe motor when brake is applied. Also available on 13″ engine and toolroom lathes, it can be installed on 13″ lathes now in use. Write South Bend for details, or Circle No. S33.





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These are qualities to look for in gage blocks—qualities you'll find finest by far in Ellstrom Chromium Plated Standards. Size, flatness, parallelism unconditionally guaranteed to closer specified millionths than any other blocks you can buy. Made only of time-tested materials fully certified for uniform hardness, absolute metallurgical stability. And gaging surfaces chromium plated by an exclusive Ellstrom process to give you longer wearing millionths, lower gaging costs. Next time you buy gage blocks, be sure you get the very best—be sure to specify

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Parallelism: .000004" / Flatness: .000004"
"I" Inspection Accuracy: +.000004"/−.000000"
Parallelism: .000003" / Flatness: .000003"
"L" Laboratory Accuracy: +.000002"/−.000000"
Parallelism: .000001" / Flatness: .000001"

Above: Ellstrom Rectangular Set No. 85-R. Left: Ellstrom Square Set No. 81-SA, with accessories.

New Catalog contains prices and specifications—send for it today!

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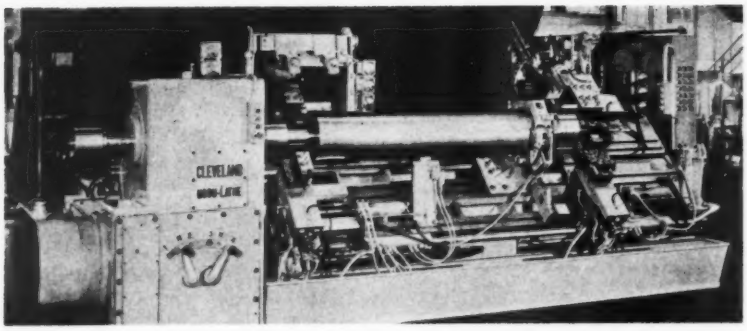
*Ellstrom—*Measuring in millionths for three generations*

Hjalmar Ellstrom (1863-1942)—He gave mankind the key to mass production of interchangeable parts. For it was he alone who conceived and produced the world's first combination gage blocks—the first master reference standards accurate to the infinitesimal millionth part of an inch!

CIRCLE INFORM-A-GRAM KEY NO. 85

New Modular Machine



Three of the new modular machine tools and a complete display of components that make up various lathes will be on exhibit at the Cleveland Hobbing & Machine Co. booth at the Machine Tool Exposition. Four headstock combinations and six beds can create the following machines: profile lathes for both 180° and 270° configurations, turret lathes, pedestal lathes, and automatic bar and chucking production lathes. Also on exhibit will be hobbing machines, a hard tooth finishing machine, and chip-breaker and tool booster. For details, Circle Inform-A-Gram No. S34.

DRILL PRECISION HOLES FASTER

Burgmaster Bench Model Automatic Turret Drill With Manual Positioning Table and Power Feed

GREATLY REDUCE TOOLING COSTS

Burgmaster Bench Model 6-Spindle Turret Drill equipped with Manual Positioning Table and Automatic Power Feed, is a combination that greatly increases production and slashes tooling costs by eliminating expensive jigs and fixtures.

MANUAL POSITIONING TABLE

The free floating table mounted on ball bearings permits rapid, effortless positioning by pointing to a hole center on the Master Pattern. Releasing a thumb button on the Operating Handle locks the table at each position within .0005" and also initiates the automatic feed stroke of the turret. The turret returns to "top stop", and at the next table position, repeats without indexing unless cycled by the operator's push button on the control panel.

PRE-SET POWER FEED

A solenoid controlled air motor and Hydrochek allows preset infinitely variable positive feed rate, with fully adjustable rapid down and return from point of hole entry. The unitized control panel is side mounted and provides a Function Selector for OFF, MANUAL and AUTOMATIC, with separate EMERGENCY UP and START buttons.

TYPES OF OPERATION

1. Manual—operation with Power Feed
2. Semi-Automatic — Cycling through a predetermined set of operations—load and unload manually.
3. Fully Automatic — Cycles automatically using shuttle tables, index tables, hopper feeds, etc.

ALL FOR LESS THAN THE COST OF SIX SPINDLE PRODUCTION TABLE DRILL PRESS

Capacity—¼" drill and tap in steel. Why not investigate further how the Burgmaster Bench Model Automatic Turret Drill with Manual Positioning Table and Power Feed can save you money. Write today for free literature.

BURGMASTER CORPORATION

SMALL TOOL DIVISION – BURG TOOL MANUFACTURING CO., INC.

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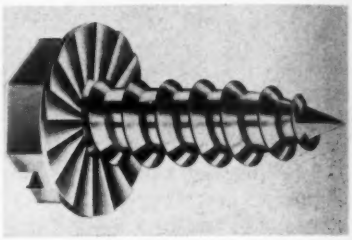
World's largest manufacturer of turret-type drilling and tapping machines.

CIRCLE INFORM-A-GRAM KEY NO. 86

Hole Drilling Tapping Screw

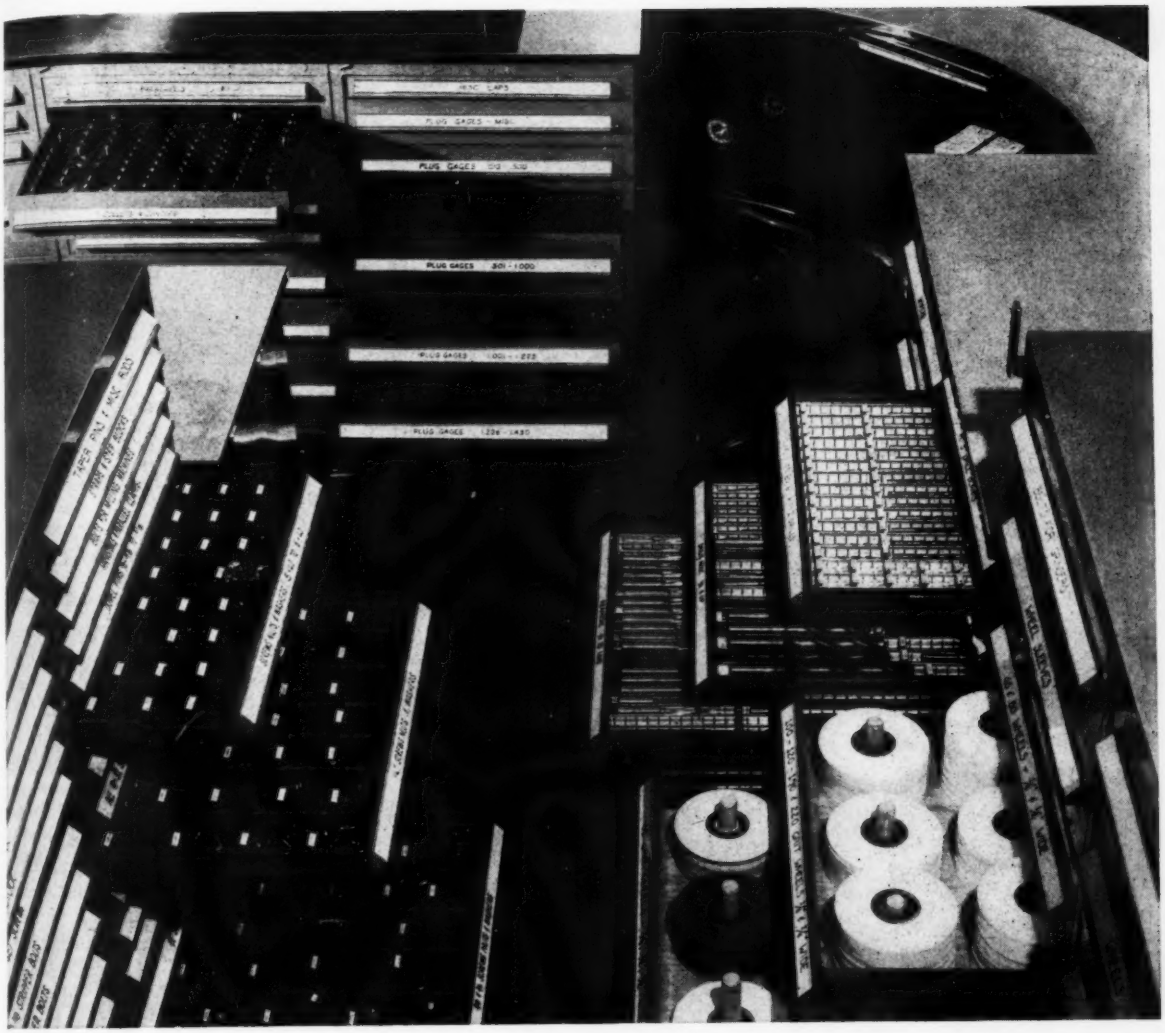
An improved hole drilling tapping screw that eliminates hole punching or drilling of light gauge sheet metal (illust.) is one of the items to be shown by Parker-Kalon at Booth 489 at the Production Engineering Show. Called



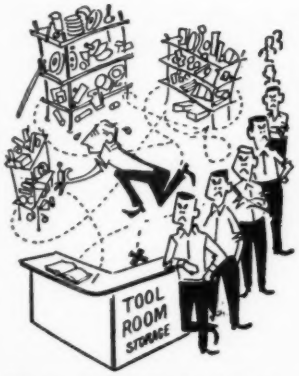
Tapits, this screw not only drills its own hole and forms its own thread, but has an integral washer with a serrated face that acts as a built-in brake to minimize strapping and spinning. A line of socket screws with plastic inserts will also be displayed. For details, Circle Inform-A-Gram No. S35.

Inspection Equipment

Micrometrical Mfg. Co. will exhibit their line of shop equipment for measuring roughness, the Wavometer for measurement and control of waviness on symmetrical surfaces of rotation, and the Anderometer for measuring the characteristics of assembled ball bearings that result in noise and vibration. See this complete line at the Production Engineering Show and to get literature, Circle Inform-A-Gram No. S36.



This storage space makes money



THIS ONE DOESN'T. *Outdated storage—disjointed, harum-scarum—keeps skilled workers waiting needlessly. Everything hard to see, hard to find, hard to keep track of.*

HOW? By putting more spare parts, tools, gages, fixtures, assemblies and components into a given area than could possibly be fitted into outdated tool cribs or storage bins. And by keeping them close at hand, fully visible...absolutely safe from damage, loss, dust or pilferage.

Vidmar industrial storage units are of heavy gauge steel. Cabinets come in various heights, and so do drawers—which can be partitioned in unlimited arrangements. Drawers are strong, holding up to 400 lbs. each! All units are modular...can be moved, interchanged, re-arranged, and added-to as required from year to year.

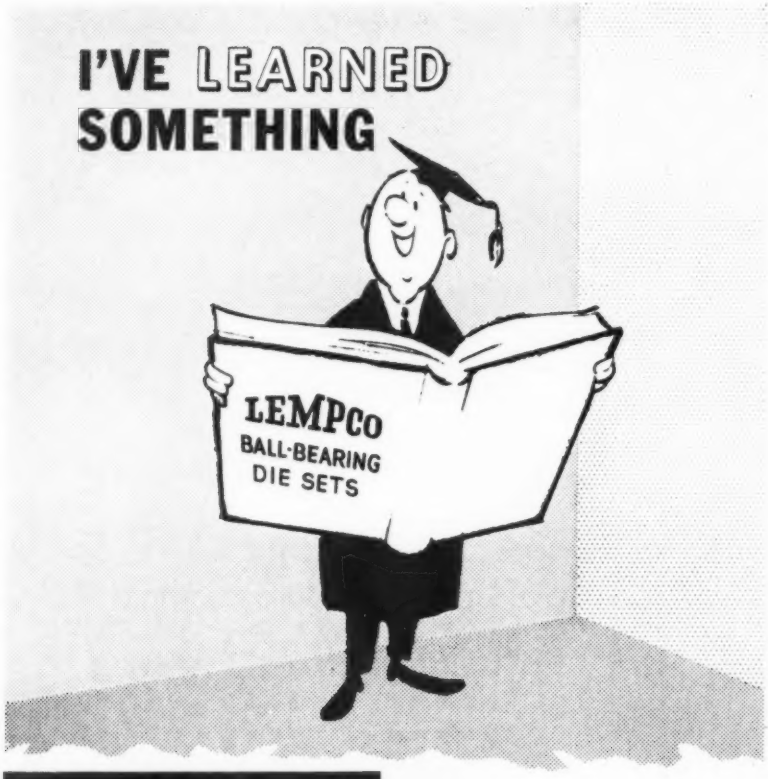
BEFORE YOU revise or add to your storage facilities, it will pay you to check Vidmar industrial storage units. Write today for descriptive literature. VIDMAR, INC., 2326 Reach Road, Williamsport, Pa.

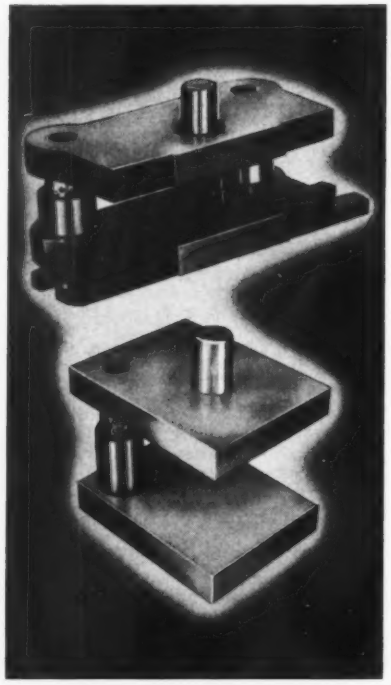
Store more...better...in less space with

Vidmar CABINETS

Division of VOLKERT STAMPINGS, INC.

CIRCLE INFORM-A-GRAM KEY NO. 87





Operating on Ball Bearing Bushings, with Aluminum Alloy Retainers, Lempco Die Sets deliver millions of strokes, retaining phenomenal precision of alignment, requiring only an occasional dab of grease for lubrication.

NO OTHER DIE SETS HAVE LEMPCO FEATURES!

Better look at those Lempco "M" and "L" style die sets, too; they're *all-steel* yet sell for the price of cast iron.

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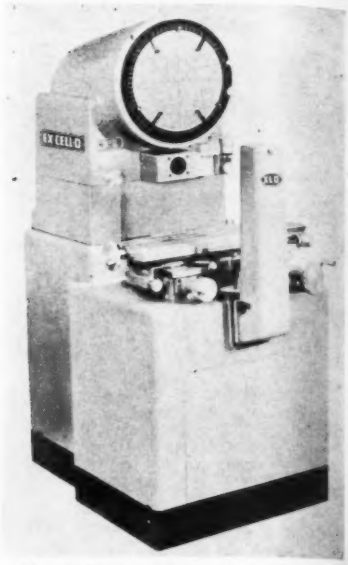
Contour Projector Line



Ex-Cell-O Corp. is presenting its entire line of contour projectors in six models ranging in screen size from 8″ to 30″ at Booth 946 at the Machine Tool Exposition. Versatile, rugged, and accurate to tenths, Model 14-5 (pictured) with 14″ screen has the Kodak optical system, and coated Ektar lenses in the optics and Fresnel lens behind the screen that guarantee bright, glare-free images under normal room illumination. The large staging area provides plenty of room to measure large objects.

Also featured at the exhibit is Model 30 with drop front, developing a staging area that will accept and measure parts up to 12″ dia. For details, write the company, or Circle Inform-A-Gram No. S37.

Varied Machining

Eastern Machine Screw Corp. will introduce and display a variety of machines at the Machine Tool Exhibition. See the Loungway rise and fall abrasive belt grinder, a threading machine, a thread rolling machine used for second operation thread rolling on small parts or on thru-feeding of long bars, and an automatic screw machine.

A new solid adjustable die, measuring less than 1″ dia, that's used on Swiss type automatics, and capable of producing quality threads as small as #000, will also be on display. For details, Circle Inform-A-Gram No. S38.

CONTRACT SERVICES DIRECTORY

Listings, $12.00 per inch ($1.50 per 1/8 inch) Minimum charge, $4.50 per insertion. Rates net.

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1436 East 47th St., Cleveland, Ohio. Founded in 1908. Builders of Special Machinery. General Machine Work.

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NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, BEdford 2-2800. Tooling, Short Run Production and Machined Parts for Automation.

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We resharpen dull machine/hand files to new file efficiency. No acids. No annealing, any shape, length or cut. Guaranteed.
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Factory: Beaver Falls, Pa.
Office: 446 NE 75th St., Miami, Fla.
Machine tool salesmen wanted, all territories, side line.

MINIATURE DRILL BUSHINGS
Hole Sizes—No. 80 to 3/32"
O.D. 3/32" to 13/64"
Lengths 1/4" to 3"
.0002 Tolerance on I.D.
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Specials to your specifications
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JOHANSSON GAGING EQUIPMENT

Assures You Precision to the Finest Degree to Meet Your Requirements —Backed by the Name Supreme in the World of Measurement

GAGE BLOCKS
(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

INTERNAL INDICATORS
(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

MIKROKATOR
(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

OTHER JOHANSSON PRODUCTS
Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.

C E J MIKROKATOR 502-E

Mikrokator No. 502-E is a precision instrument for dimensional measurements.

It is provided with a mechanical, frictionless amplification device without sliding bearings or gears and there is no play, wear or binding.

The purpose of the instrument is to give accurate measurements both in mass production checking and in checking individual parts.

The instrument is made in three different designs and in both inch and millimeter.

Cat. No.	Range	Graduated	Shaft Diameter
502-E-2	.016	.0002	3/8"
502-E-4	.004	.00005	3/8"
502-E-5	.002	.00002	3/8"
502-E-6	.0012	.00001	3/8"

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BALL HANDLES — THREADED

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OVA OVAL PLASTIC

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Will give your product that "dressed-up" appearance. Made in a wide variety of diameters and thread sizes. Round and oval plastic supplied in red or black. Polished steel handles also supplied. Low prices and finest quality.

COMPRESSION SPRING ASSORTMENT

Available in many sizes ranging from 3/32" to 1-1/2" diameter. Made from music wire. All springs 10" long. Select the size required and cut to length wanted. Saves time and money.

Extension spring assortment, ranging in diameters from 1/8" to 1". All are 11" long. Low prices.

REID TOOL SUPPLY CO.
MUSKEGON HEIGHTS, MICHIGAN

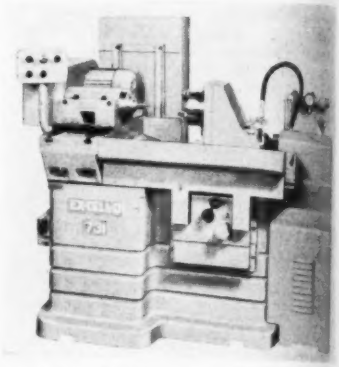
CIRCLE INFORM-A-GRAM KEY NO. 893

Boring & Grinding Machine

A dual purpose electrolytic tool grinder for grinding carbides is one of the products to be exhibited at Ex-Cell-O Co.'s Booth 946 at the Machine Tool Exposition. Featuring a diamond wheel and large tool rest table for face grinding at one end, and a narrow straight wheel at the other end for grinding chipbreaker grooves, Model 264 reciprocating tool grinder offers

diamond wheel savings inherent in the electrolytic method. For details, Circle No. S39.

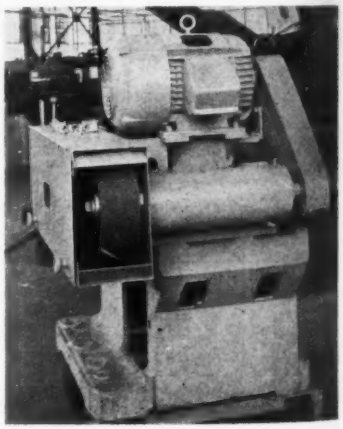
Two new double-end and two new single-end standard precision boring machines, also to be displayed, perform such operations as



precision boring, turning, facing, counterboring, and chamfering, and are easily adaptable to point-to-point numerical control or incorporation into automated production lines. Write Ex-Cell-O for details, or Circle Inform-A-Gram No. S40.

Abrasive Belt Attachment

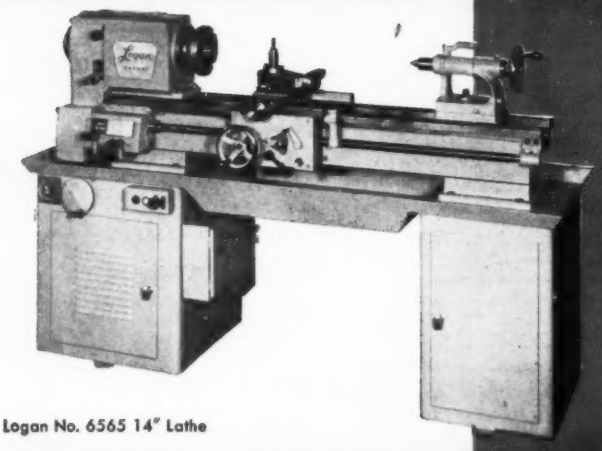
Production Machine Co. will exhibit a new abrasive belt grinding attachment at the Production Engineering Show. An entirely new design, it's built for mounting on heavy duty lathes, mills, or planers. Equipped with heavy taper



nose spindle, this unit is capable of heavy stock removal, close tolerance size control, and low-microinch finishing. It can be mounted in horizontal, vertical, or angular positions. For details on the unit, Circle Inform-A-Gram No. S41.

its specifications add up to high production capacity

Logan 14" Lathe



Logan No. 6565 14" Lathe

Logan designs greater reliability and accuracy, and longer life into its lathes by a generous combination of high-capacity features. For instance—

- An oversize spindle with 1⅝" bore turns on four super-precision ball bearings with built-in preload
- A variable-speed drive lets you change speed while work is turning—without shifting belts
- A warp-free lathe bed with high, strong walls braced by oversize ribs to withstand heaviest stresses; two V-ways and two flat ways are flame-hardened and precision-ground.

There are many more reasons why this and other Logan Lathes have a greater capacity. The complete specifications tell the story. Write for them.

- Spindle speeds to 2000 rpm
- 1½" Levermatic collet chuck capacity
- 14⅝" swing over bed
- 9" swing over saddle cross slide
- 40" between centers

LOGAN ENGINEERING CO. Dept. M-960, 4901 Lawrence Avenue, Chicago 30, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 90

Priced lower than competitive 3rd axis control systems

Hughes 3rd Axis Depth Control
offers you these production advantages:

- Eliminates the setting of depth limit stops
- Automates deep-hole drilling
- Drills holes of various depths with same spindle
- Programs dwell for accurate counter-boring
- Holds depth accuracy to ±.001″
- Makes possible pre-setting of tools away from machine

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INDUSTRIAL SYSTEMS DIVISION
HUGHES AIRCRAFT CO.

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Or write, teletype (TWX INGL 4117) or call: Hughes Industrial Systems Division, P.O. Box 90904, Los Angeles 45, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 91

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. . . when you make critical replacement parts from handy **AMPCO®** Stock Products

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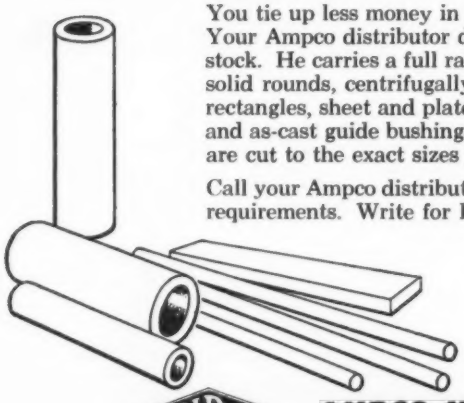
Strict laboratory control maintains important physical properties in Ampco copper-alloy stock products. They outlast ordinary bronze many times in severe service . . . reduce down-time by extending part-life in gears, nuts, bearings, bushings, other parts.

You tie up less money in in-plant inventories. Your Ampco distributor delivers immediately from stock. He carries a full range of sizes in extruded solid rounds, centrifugally cast stock bars, extruded rectangles, sheet and plate, stock die blanks, and as-cast guide bushings. Rod, sheet, and plate are cut to the exact sizes you need.

Call your Ampco distributor for all your copper-alloy requirements. Write for Bulletin G-51.

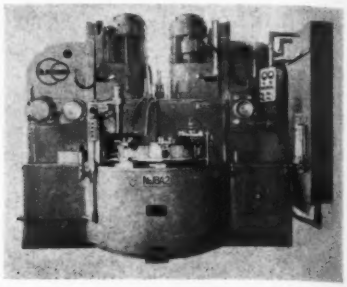


AMPCO METAL, INC.
Dept. 541 • Milwaukee 1, Wisconsin
West Coast Plant: Huntington Park, California
Southwest Plant: Garland (Dallas County), Texas
D-80

CIRCLE INFORM-A-GRAM KEY NO. 92

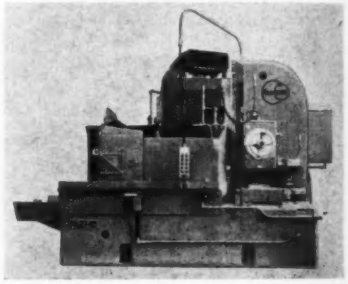
Two Surface Grinders

At Booth 1209 of the Machine Tool Exposition, the Blanchard Machine Co. will exhibit two new surface grinders, grinding wheels, and accessories. Model 18-A2 is a new two-spindle automatic surface grinder of a dry base design: in



operation all coolant and chips flow out of the grinder to an outside settling tank or central coolant system. It has a plain table for mounting special work-holding fixtures and a six-speed gear box for table rotation. Circle Inform-A-Gram No. S42.

Model 27-48 surface grinder is equipped with hardened base ways, is of dry base design, and has a conveyor-type sludge tank mount-



ed at the rear of the grinder. This machine has a 48″ dia magnetic chuck with a clearance of 52″ inside the waterguards, 12″ vertical range, and a 27″ segment grinding wheel. For details, Circle Inform-A-Gram No. S43.

Tooling & Production's

PREVIEWS

OF THE

CHICAGO SHOWS

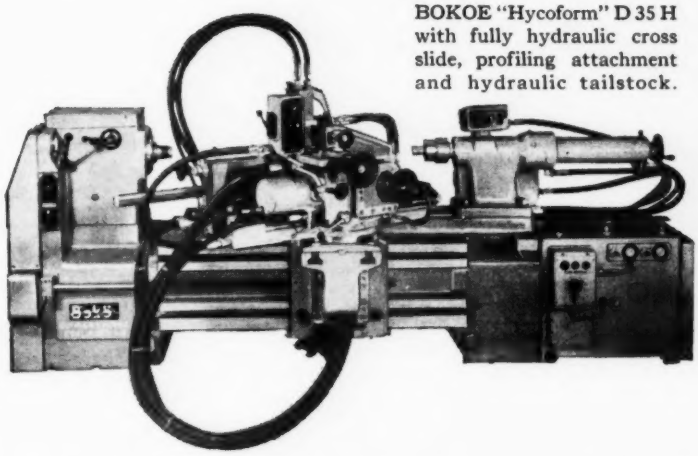
BEGINS ON PAGE 69

OF THIS ISSUE.

You can Adapt BOKOE Flow Forming & Spinning Lathes To Your Exact Production Needs

From simple spinning lathes to fully hydraulic "Hycoform" machines with built-in copying attachment and automatic cycle control.

BOKOE adaptability can save you money—and simplify your spinning or flow forming production problems. BOKOE's "building block" design lets you choose a machine suited exactly to your production requirements. You don't have to "get by" with sub-capacity machines, or over-invest in more machine than you need. And you can extend the production performance of your BOKOE machine whenever necessary.



BOKOE "Hycoform" D 35 H with fully hydraulic cross slide, profiling attachment and hydraulic tailstock.

From basic design with hand rest and mechanical tailstock, BOKOE machines can be extended to include:

- Mechanical, hydro-mechanical or fully hydraulic cross-slide
- Front only or combined front & rear cross-slides
- Mechanical or fully hydraulic tailstock
- Built-in, hydraulic copying attachment
- Automatic cycle control

BOKOE Light Spinning Lathe D 35 L with hand rest and mechanical tailstock.

There's a BOKOE machine for every type of spinning and flow forming operation—for light and heavy work on ferrous and non-ferrous materials—for cylindrical and conical shapes and nose cones used in aircraft and missile applications.

- Flow forming of Aluminum up to $\frac{3}{8}$" thickness
- Flow forming of soft steel up to $\frac{1}{4}$" thickness
- Swing up to 86" maximum
- Longitudinal slide movement of 40"

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Coliseum
Machinery Show
September 7 - 15
BOOTHS 117 & 653
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Nationwide Sales and Service
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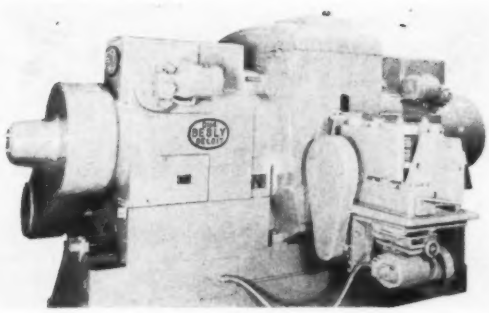
In Canada contact **Cosa Corporation of Canada, Ltd.,** 1160 Lakeshore Rd., Long Branch, Toronto 14, Ont.

CIRCLE INFORM-A-GRAM KEY NO. 93

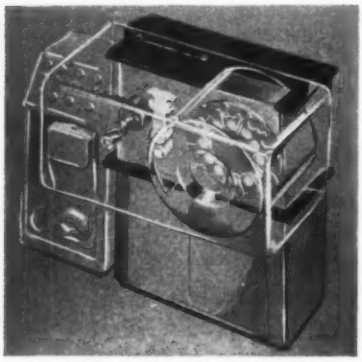
New Disc Grinder



This double horizontal spindle machine makes disc grinding virtually automatic. The Besly DH 4 features simplified pushbutton operation, accuracy to tenths, simple 3-stop abrasive change, automatic dressing and sizing, centralized one-shot lubrication, and an improved coolant system. It has built-in dials and gages, and can handle almost any type of part having two parallel surfaces to be ground. Besley-Welles Corp. will exhibit it at Booth 251, Machine Tool Exposition. For details, Circle Inform-A-Gram No. S46.

Automatic Tool Changer

The Scully-Jones automatic tool changing system, to be introduced at the Production Engineering Show, can easily be engineered into various tape controlled single spindle machine tools. It changes tools in approximately 3 sec and incorporates a key in the tool encoder allowing the selection of any



one of over 65,000 possible tool combinations for automatic tool change.

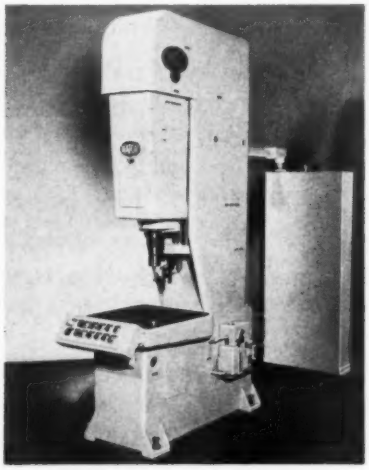
It includes a pneumatic or hydraulic actuated spindle chuck, basic toolholders, transfer arm, tool storage matrix, tool encoder, and logic circuit. Manual tool changing is also possible. Circle Inform-A-Gram No. S44.

High-Temp Laminates

High-temperature and flame-retardant thermosetting laminated plastics will be featured at the Production Engineering Show by Synthane Corp. The high-temp plastics were developed to provide special materials for the increasing interest in higher temperature laminates. See the glass-base and paper-base grades, or Circle No. S45.

Versatile Machine Tools

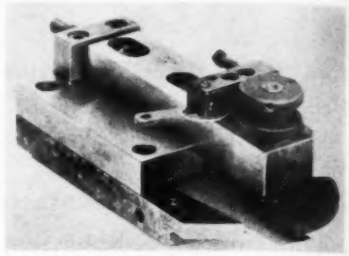
Seven new machines, representative of the new lines of National Automatic Tool Co., Inc., will be on display in Booth 1205, Machine Tool Exposition. The mechanical honing machine has the ruggedness and precision to perform round-



the-clock production honing operations on bores up to 3″ dia and 3″ long. Other machines to be seen are the hydraulic honing machine, automatic centering machine, hydraulic press brake, and building block units. Write National for details, or Circle Inform-A-Gram No. S47.

Roll Marking Devices

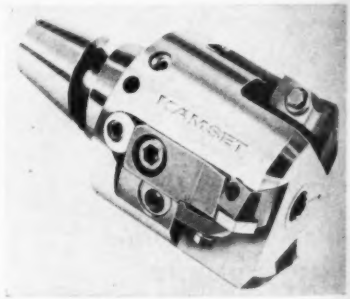
One of the three different types of new models of automatic roll marking devices manufactured by New Method Steel Stamps, Inc. is pictured here. Used for OD marking, end-face marking, and cut-off marking, these devices can be seen in action in Booth 257 at



the Production Engineering Show. A B&S automatic screw machine, equipped with the three markers, will be in continuous operation. Using bar stock, a part will be formed on the back slide, graduated on the front slide, marked on the end from the turret, and marked and cut off from the vertical slide. For details, Circle Inform-A-Gram No. S48.

Throwaway Tooling

The new Kamset boring cutter uses throwaway inserts to develop fine finishes and boring tolerances in tenths. It features a setup adjustment to control each insert independently, and an adjustment



for simultaneous insert control during the production run.

Also exhibited by Valenite Metals will be a complete line of throwaway insert holders with adjustable chipbreakers, the V.B.U. tooling system, and a new throwaway insert type milling cutter.

See them at the Production Engineering Show, or Circle Inform-A-Gram No. S49.

DO YOU HAVE UNSOLVED TESTING PROBLEMS ?????

They can be solved. We design and build special testing machines to fit the most peculiar requirements.

Tell us about yours.

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USE IT EITHER WAY

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complete with cord, plug, switch ready to use

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Eclipse CUTTING TOOLS

ABSOLUTE ACCURACY ON PRECISION JOBS

MATERIAL:	Extruded aluminum aircraft engine part.
JOB:	10 cutting operations with one tool: 5 boring, 1 trepanning, 2 champfering and 2 facing.
TOOL:	Eclipse multi-diameter; replacing normal 4 tool set up.
RESULT:	Absolute accuracy and concentricity.

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- Exclusive MICROMETER Adjustment Feature For Rapid Set-Up.
- Area Sales engineers for your immediate Problems.

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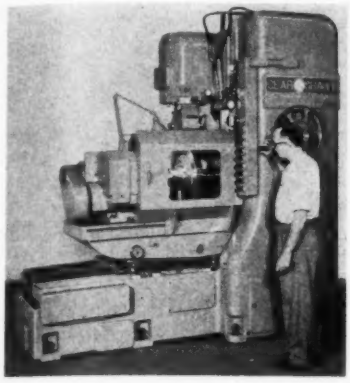
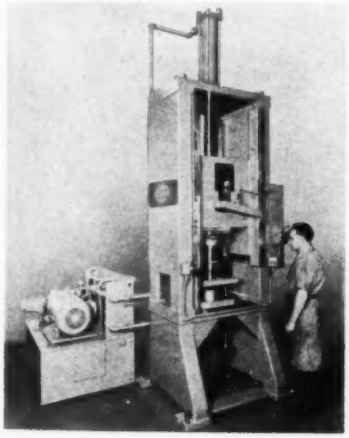
New Red Ring Machines

National Broach & Machine Co. will display six new Red Ring machines in Booth 1430 at the Machine Tool Exposition. Model GCX-24" rotary gear shaver fea-



tures a tunnel-type column design that's combined with an extended base. It handles work from 3" to 24" pitch diameter in the 2 to 16 diametral pitch range.

Another feature will be the pot-type broaching machine that produces spur and helical gears on the OD of a part by using a one-



piece broaching tool made in the form of an internal gear. A gear tooth honing machine, gear speeder with broad-band electronic amplifier, new designs of Models GRH and GRJ low-cost gear rolling fixtures with charting equipment, and a new Model PCB involute checker will also be shown. For details, Circle Inform-A-Gram No. S50.

BUY U.S. SAVINGS BONDS

for more than 40 years VAN KEUREN has been known as the source of 'Quality in Millionths'

VK presents a COMPLETE LINE of **THREAD GAGES**

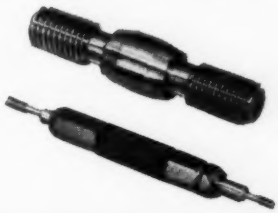
including Thread Plugs, Thread Rings and Truncated Setting Plugs.

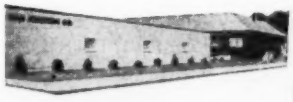
Conforming to H28 Screw Thread Standards, these gages are made under the most modern manufacturing and inspection facilities . . . eliminating all questions about size, lead, drunkenness, and angle.

Exceptional surface finish and geometry; — pitch diameters checked with VK Calibrated Thread Measuring Wires . . . all combine to give unparalleled quality. *Long gage life is assured.*

Send for new catalog 36B

VK originated the reversible plain plug gage. **Here's another first, a new** design in Reversible Thread Gages with these superior features:
- Lapped center holes, both ends
- Fit standard AGD handles
- No bushing necessary
- Center holes permit accurate lead check
- Priced the same as ordinary Reversible Thread Gages.





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PRECISION MEASURING TOOLS
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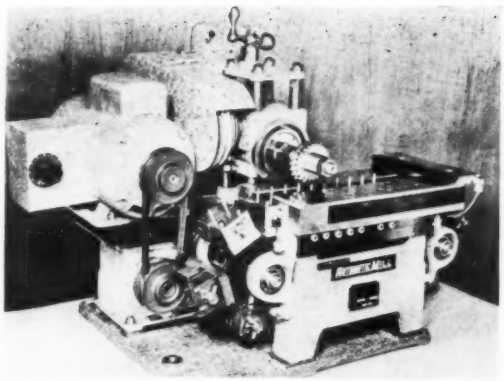
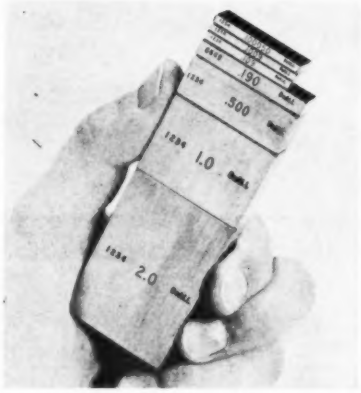
CIRCLE INFORM-A-GRAM KEY NO. 97

Automatic Milling Unit



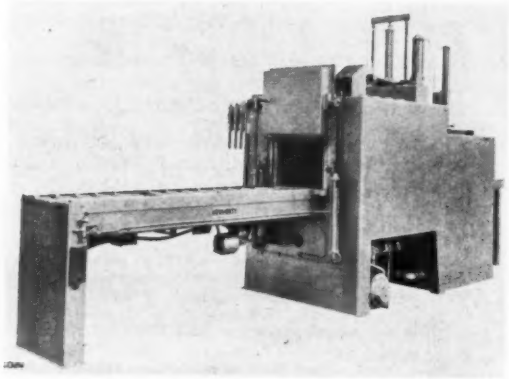
Up to 6000 parts/hr can be milled by this new automatic milling machine to be shown by The Baird Machine Co. at the Machine Tool Exposition. The AutomaticMILL is capable of maintaining tolerances of ±0.001″ in milling precision electronic components as small as 0.050″ x ¼″ and tool bits as large as 1″ square. It can be attached to the end of any milling machine. For more details, Circle Inform-A-Gram No. S51.

Side-Etched Gage Blocks



New gage blocks made of stainless steel and side-etched to eliminate errors and speed the forming of combinations are among many featured products to be demonstrated by TheDoALL Co. in Booths 116 and 118, Production Engineering Show. Other new gaging products and an exhibit of new super saw bands are also included. For information, Circle Inform-A-Gram No. S52.

Automatic Heat Treat Furnace



Hevi-Duty's gas-fired Clean-Line furnace is designed to fit easily into production line operations where continuous automatic heat treating is required. The unit makes possible step-by-step quality control in bright hardening, carburizing, carbonitriding, annealing, and normalizing operations. It's completely automatic from loading through quenching, and features simplified controls. Look for this unit at Hevi-Duty Electric Co.'s Booth 368-370 at the Production Engineering Show, or Circle Inform-A-Gram No. S53.

Hobbing, Drilling Machines

Precision small gear hobbing, drilling, and tapping machines are among the products to be displayed by The Hamilton Tool Co. Model 1-B precision gear hobber will perform tooth generating operations producing bevel gears. The new Maximus super sensitive precision drilling machine with toolroom base and compound table will also be featured. See other models of tapping, drilling, and hobbing machines at Booth 486 at the Machine Tool Exposition, or Circle Inform-A-Gram No. S54.

Precision gear hobber.

Precision drilling unit.

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 100 IN THIS ISSUE.

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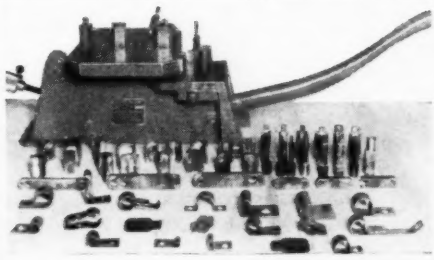

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Available in hand, air or hydraulic models. The MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to 1/8" x 1 1/2" as illustrated. Punching dies available. Other models up to 1/2" x 8" hydraulic operated. Ideal for steel rule die forming.

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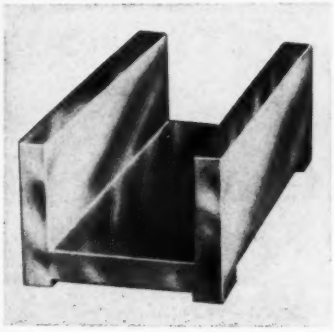

Aluminum and cast iron standard jig and fixture bodies now come in 65,000 standard sizes.

They'll cut design and toolroom time in half and can be used for drill jigs, milling fixtures and other tooling applications.

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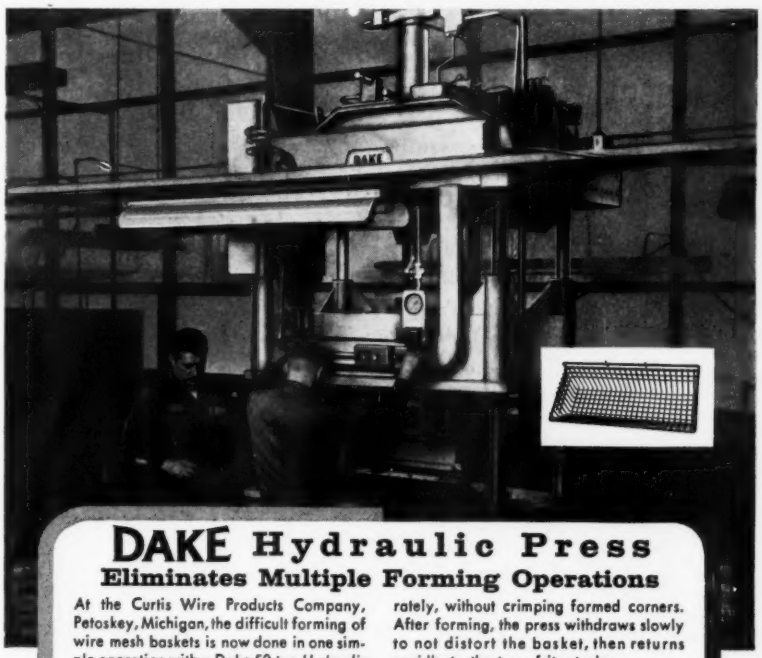
CIRCLE INFORM-A-GRAM KEY NO. 992



DAKE Hydraulic Press
Eliminates Multiple Forming Operations

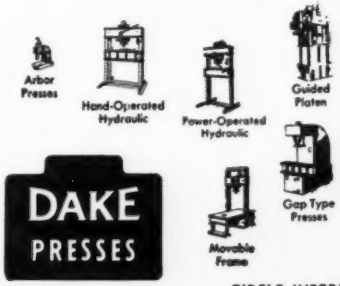
At the Curtis Wire Products Company, Petoskey, Michigan, the difficult forming of wire mesh baskets is now done in one simple operation with a Dake 50-ton *Hydraulic* Guided Platen Press. The Dake Press saves considerable production time per basket by eliminating previous operations which formed only one side at a time.

The preset cycle of the Dake Press eliminates any possibility of operator error. After the wire mesh is placed in the die, the operator presses dual palm buttons which close the press rapidly until just before the wire mesh is contacted. It then slows to an adjustable pressing speed and forms the material smoothly and accurately, without crimping formed corners. After forming, the press withdraws slowly to not distort the basket, then returns rapidly to the top of its stroke.

Every feature of a Dake Press is designed to save production time. The press stroke may be set to eliminate unnecessary travel. Rapid advance and rapid return increase the pressing cycle. Large bed area with ample daylight provides easy insertion and removal of pressed parts.

Dake Presses are available in capacities from 25 to 600 tons. For special applications, investigate the Dake line of Custom-Engineered Presses. Write for Catalog.

DAKE CORPORATION 634 Robbins Road, Grand Haven, Mich.



DAKE PRESSES

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New! Handy! Adjustable

RISER BLOCKS

for FASTER-

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Adjustable Riser Block
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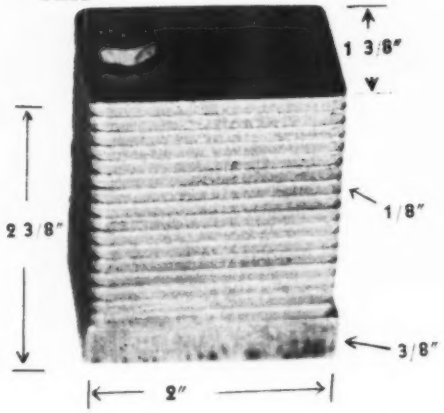
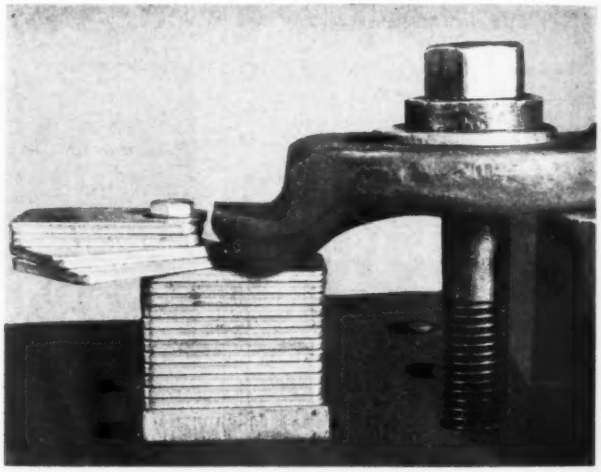
Use on Drill Presses — Milling Machines — Punch Presses — Surface Grinders — Planers — Shapers, etc.

End lost time looking for right odds and ends.

HANDY RISER BLOCKS:

- **Give heights from 3/8" to 2 3/8" in 1/8" increments.**
- **Cut setup time by eliminating haphazard blocking.**
- **$5.00 per pair, F.O.B. Cleveland, Ohio**





HANDY PRODUCTS

P. O. Box 3537, Cleveland 18, Ohio

HANDY PRODUCTS
P. O. Box 3537, Cleveland 18, Ohio

Gentlemen: Please send me _____ pairs of RISER BLOCKS at $5.00 per pair, F.O.B. Cleveland, Ohio.

NAME_____ TITLE_____

COMPANY_____

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Open account shipments on purchase orders of rated companies. Otherwise, check with order, please. No C.O.D.'s.

*Ohio customers add 3% sales tax.

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5	21	37	73	97	130	954	1343	1433	1475	1535	1581	1623
6	22	39	75	101	131	991	1371	1434	1481	1541	1582	1624
7	23	40	77	103	135	992	1372	1441	1482	1542	1583	1631
8	24	41	79	105	136	993	1373	1442	1483	1543	1591	1641
9	25	42	81	106	138	994	1374	1451	1491	1544	1592	1642
10	26	43	83	109	141	1211	1391	1452	1492	1545	1593	1643
11	27	44	84	111	142	1212	1392	1453	1501	1546	1594	
12	28	45	85	113	165	1271	1393	1454	1511	1547	1601	
13	29	47	86	115	166	1272	1394	1461	1512	1551	1602	
14	30	48	87	117	891	1273	1401	1462	1521	1552	1603	
15	31	49	88	119	892	1331	1402	1463	1522	1561	1611	
16	33	50	90	120	893	1332	1403	1471	1531	1571	1612	

EDITORIAL ITEMS

C1	C16	C31	C46	P6	P21	P36	S4	S19	S34	S49	S64	S79
C2	C17	C32	C47	P7	P22	P37	S5	S20	S35	S50	S65	T1
C3	C18	C33	C48	P8	P23	P38	S6	S21	S36	S51	S66	T2
C4	C19	C34	C49	P9	P24	P39	S7	S22	S37	S52	S67	T3
C5	C20	C35	C50	P10	P25	P40	S8	S23	S38	S53	S68	T4
C6	C21	C36	C51	P11	P26	P41	S9	S24	S39	S54	S69	V1
C7	C22	C37	C52	P12	P27	P42	S10	S25	S40	S55	S70	V2
C8	C23	C38	D1	P13	P28	P43	S11	S26	S41	S56	S71	V3
C9	C24	C39	D2	P14	P29	P44	S12	S27	S42	S57	S72	V4
C10	C25	C40	D3	P15	P30	P45	S13	S28	S43	S58	S73	V5
C11	C26	C41	P1	P16	P31	P46	S14	S29	S44	S59	S74	
C12	C27	C42	P2	P17	P32	P47	S15	S30	S45	S60	S75	
C13	C28	C43	P3	P18	P33	S1	S16	S31	S46	S61	S76	
C14	C29	C44	P4	P19	P34	S2	S17	S32	S47	S62	S77	
C15	C30	C45	P5	P20	P35	S3	S18	S33	S48	S63	S78	

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THESE INFORM-A-GRAM CARDS are for the convenience of TOOLING & PRODUCTION readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured —all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the number of the items wanted. If there is no identifying number, use the page number.

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C5	C20	C35	C50	P10	P25	P40	S8	S23	S38	S53	S68	T4
C6	C21	C36	C51	P11	P26	P41	S9	S24	S39	S54	S69	V1
C7	C22	C37	C52	P12	P27	P42	S10	S25	S40	S55	S70	V2
C8	C23	C38	D1	P13	P28	P43	S11	S26	S41	S56	S71	V3
C9	C24	C39	D2	P14	P29	P44	S12	S27	S42	S57	S72	V4
C10	C25	C40	D3	P15	P30	P45	S13	S28	S43	S58	S73	V5
C11	C26	C41	P1	P16	P31	P46	S14	S29	S44	S59	S74	
C12	C27	C42	P2	P17	P32	P47	S15	S30	S45	S60	S75	
C13	C28	C43	P3	P18	P33	S1	S16	S31	S46	S61	S76	
C14	C29	C44	P4	P19	P34	S2	S17	S32	S47	S62	S77	
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With A-L's Tool Steel Steelector System

You Check Warehouse Availability Right At Your Own Desk

How often have you wished that you could bring the tool steel warehouse right to your desk so that you could see what grades and sizes and shapes are available immediately?

The new Allegheny Ludlum STEELECTOR Program does virtually just that. Special Data Stock Lists (18 of them) for each STEELECTOR Grade specify the complete necessary range of sizes and shapes available that will suit virtually all applications. They also list the working hardness of typical applications, temperatures for hardening, tempering, and annealing, plus other data.

You can count on the availability of STEELECTOR Grades. Mill depot and warehouse stocks have been selected and arranged to take the pressure off your own inventory. With the STEELECTOR Program you can select tool steels almost at a glance and be sure that the steel you have picked is in stock—ready for delivery—before you place your order.

Three STEELECTOR Cards make it easy to choose the proper steel for your application. The cards cover tool room, hot work, and high speed grades. The properties of the STEELECTOR Grades are shown by bar graphs for abrasion resistance, toughness, size stability, machinability, and red hardness. You can pick the grade with the particular combination of properties you need just by glancing at the graphs.

The colorful Tool Steel STEELECTOR Booklet gives complete details of the program, explains the Data Stock Lists, and includes the three STEELECTOR Cards. Ask your Allegheny Ludlum sales representative for your copy, or write: ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. TP-9.***

STEELECTOR PROGRAM

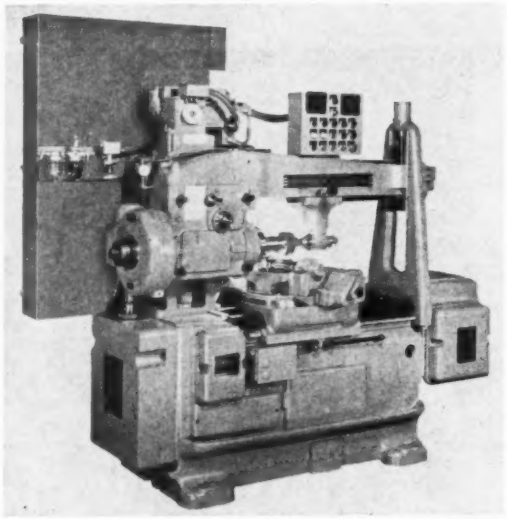
ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

1555

CIRCLE INFORM-A-GRAM KEY NO. 101

Hobbing Machines Go Automatic

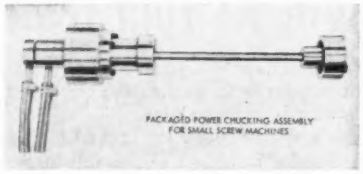


Standard-type hobbing machines, on which all functions of the hob carriage and workslide are controlled automatically, introduce new economies for both high - volume and job-lot production of gears and splines. The 16-16 Multicycle machine, with three different pre - selected work cycles, will be demonstrated by Barber-Colman Co. at the Machine Tool Exposition.

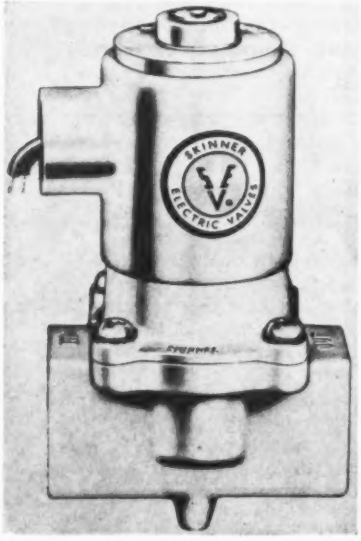
The power vertical feed of these versatile machines permits hobbing worm gears in addition to the usual range of spur and helical gears and splines. Production time is increased because the power feed in both the horizontal and vertical axes can often substantially reduce the approach, which often accounts for a high percentage of the total time required to produce a gear. See these machines, or Circle Inform-A-Gram No. S55.

Variety of Chucks and Valves

One of the feature items at The Skinner Chuck Co. Booths 212-214 at the Production Engineering Show will be the new power chucking assembly for B&S automatic and hand screw machines. This assembly makes it possible to convert B&S and similar screw machines to air chucking to chuck cold drawn and odd shaped parts



at higher speeds and at less cost. It consists of a 4" air chuck with two or three jaws and work ejector, a threaded draw bar, a rotating air cylinder, and cylinder adapter.

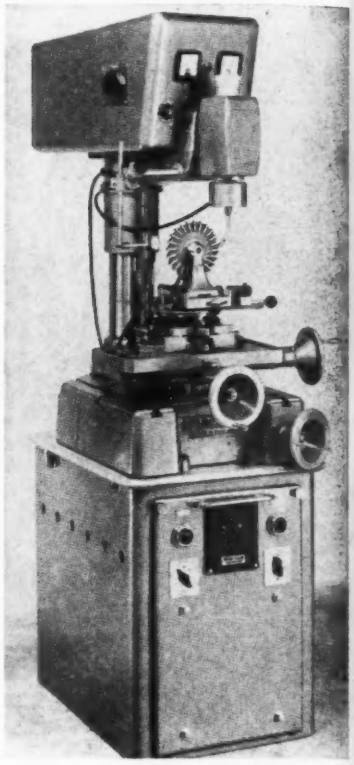


The Skinner Electric Valve Division will display five valves at the same booths. One completes the L series 2-way line. It is a valve with a 1" dia orifice and 1" NPTF ports in normally-open and normally-closed construction. Operating pressure differential is from 5 to 150 psi. Circle No. S56.

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 100 IN THIS ISSUE.

It is for your convenience when making inquiries.

Longer Tool Life



Sparcard carbide deposition (illust.) a means of increasing tool life 50% to 400% will be demonstrated at the Coliseum Machinery Show by Easco Products, Inc. Sparcarding bonds carbides to the tool surface by electrical discharge, providing hardness and wear resistance to high speed tools. Sparcarding of punches and dies increases life, eliminates galling, and will not chip or flake.

Also featured will be the arc metal disintegrator Model 2-DB. Speed in setup and operation are combined in the restyled cabinet, facilitating access to all service areas. Stop at Booth 222, or Circle Inform-A-Gram No. S57.

Fluid Power Exhibit

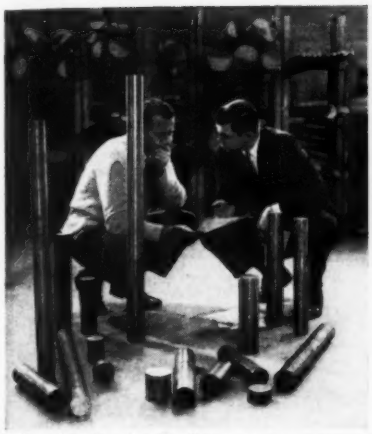
On display at Booth 106-108 of the Production Engineering Show is the revitalized Miller "College of Cylinder Knowledge," featuring the proven methods of selecting, pre-testing, and applying essential fluid power components such as air and hydraulic power cylinders, accumulators, seals, and fluids. Stop at Flick-Reedy Corp.'s booths, or get data by Circling No. S58.

NEW TOOL STEEL SERVICE

cuts inventory costs

Using too many grades of tool steel can lead to over-stocking —

that's when you need the benefits of Crucible's new Tool Steel Service!



A Crucible Service Engineer can prove that buying a few basic grades —

in quantity — enables you to carry fewer pounds in stock . . .

gives you a lower price per pound (you eliminate small quantity "extras"),

and with fewer grades to identify, you reduce the possibility of "mixed" steel.

All through standardizing on a few basic steels!

For the full story on this cost-reducing service, call in a Crucible Service Engineer

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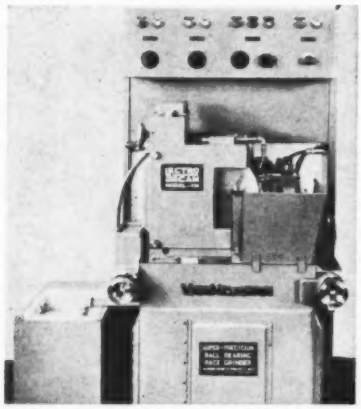
CRUCIBLE STEEL OF CANADA, LTD., SOREL, QUEBEC, CANADA

CIRCLE INFORM-A-GRAM KEY NO. 103

Grinding and Milling Machines



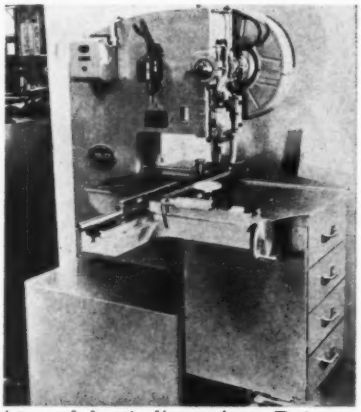
A new miniature ball bearing precision race grinder and two new ram-type milling machines will be exhibited by Van Norman Machine Co., a Div'n of Van Norman Industries, Inc., at Booth 351 at the Machine Tool Exposition. The race grinder, Lectro-Cam Model 1-M, (illust.) grinds inner races to tolerances of less than 0.000050".

The new 1R-22-3 and 1RQ-22-3 milling machines are designed for faster, more precise production at lower cost. They're extremely rugged, compact, all-purpose millers with exceptional versatility, and are built for easy operation and for the most demanding day-in, day-out milling production. Get information from Van Norman, or Circle Inform-A-Gram No. S59.

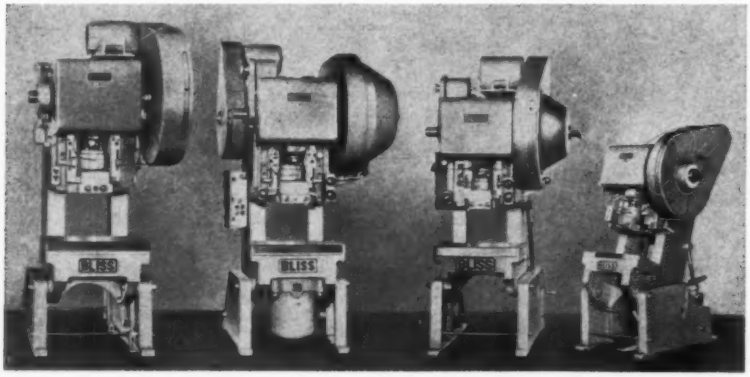
Use the convenient Inform-A-Gram Card for quick inquiry service — following page 100

Pressed Metal Production Ideas

Focal point of the E. W. Bliss Co. exhibit will be four models of the new Big C Series inclinable presses. Important new features include modern cast Meehanite frames which reduce deflection at full tonnage, increased dimensions in bed and die areas, and heavier design of all load-bearing working parts. Another unusual development is a portable inclining device that can be used with a whole battery of presses, eliminating the cost of separate units for each press. For Big C details, Circle V5.

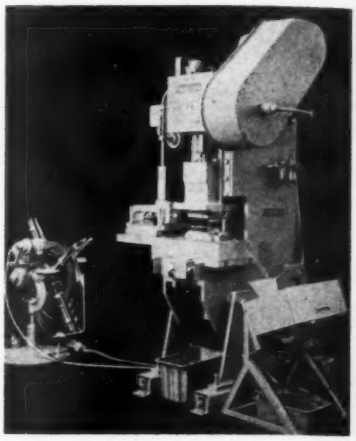


Bliss will also introduce a precision positioning and piercing machine (right) that sets up in less than a minute and can locate holes within 0.001". The positioning table permits rapid adjustment of side and depth dimensions. Data on these presses and other models Bliss will display at Booth 1325 at the Machine Tool Exposition is available from Bliss, or Circle Inform-A-Gram No. S60.



Pressworking Equipment

An exhibit of presses, press brakes, and shears is planned for Booth 1330 at the Machine Tool Exposition by Niagara Machine & Tool Works. Sharing the spotlight will be an ultra-high speed fully-



automatic OBI press operating at variable speeds up to 1000 spm to produce parts at a million/day rate.

Other equipment to see is a 45-ton front-to-back crankshaft OBI press equipped with automatic roll feed, stock reel, and scrap cutter, stamping out fuse tips at a million/day rate; a 250-ton two-point suspension straight-side eccentric-geared press equipped to operate in an automated line; and a 400-ton hydraulic press brake equipped with a variety of forming dies. Get additional information by Circling Inform-A-Gram No. S61.

High Strength Steel Bars

Heat treating and costly secondary operations are eliminated with the new "e.t.d." 150 alloy steel bar. Made by La Salle Steel Co.'s elevated temperature drawing process, the 4100 series steel bar stock has a minimum tensile strength of 150,000 psi and 32-36 Rc hardness. The bars are designed to replace heat treated alloy steels for parts such as shafts, gears, fasteners, and axles. They'll be on display at Booth 147, Production Engineering Show. For details, Circle Inform-A-Gram No. S62.

Thor

Everything you want in 360 CYCLE Grinders...

and more!

25% faster metal removal. Compare it with *any* other type grinder.

30% saved on wheel cost. Constant speed gets maximum cutting power from the abrasives.

8% speed loss *under full load*—which saves you...

80% on power cost.

30% is the *minimum* overall saving.

100% best buy in High Frequency Electric Grinders!

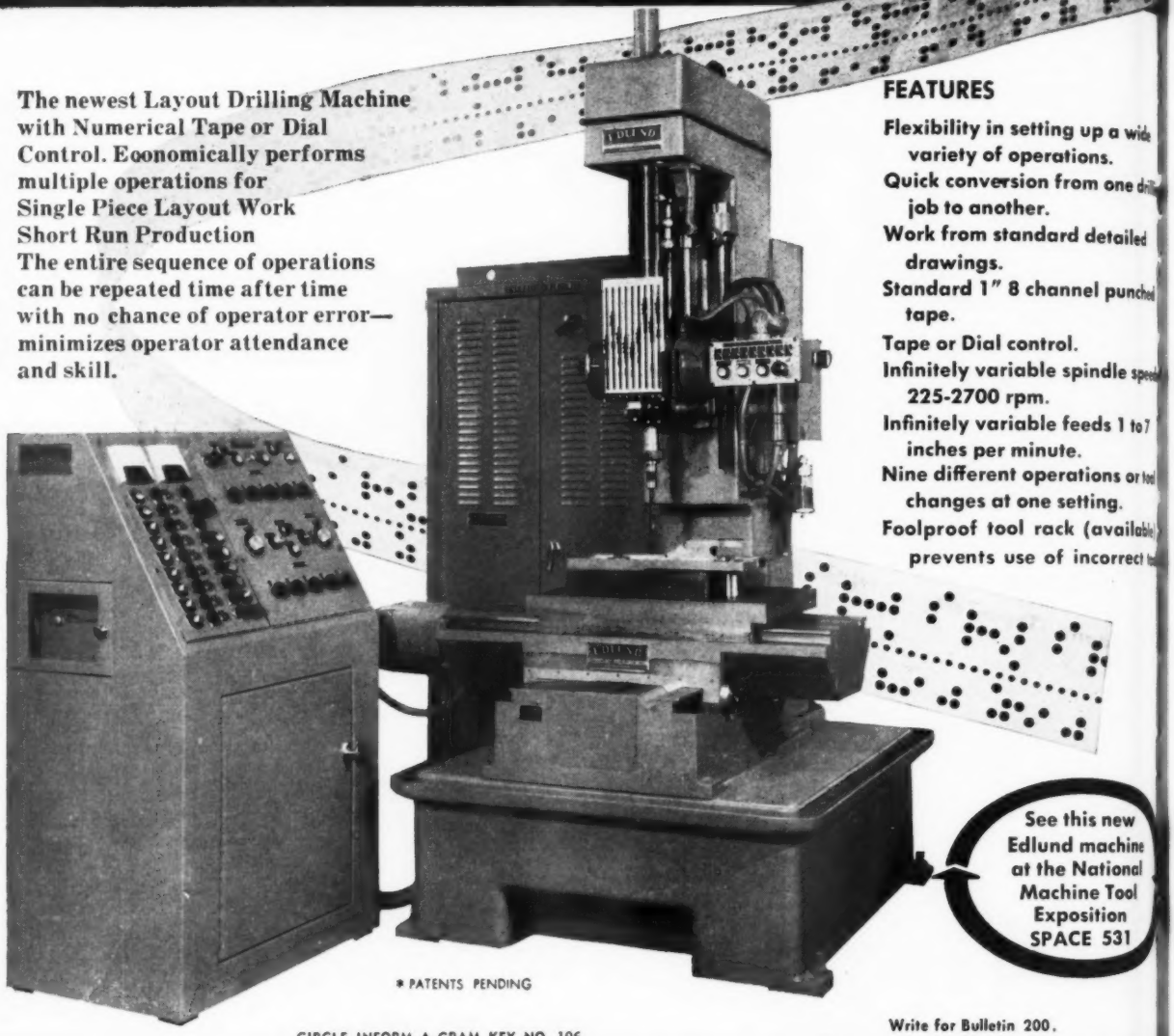
Thor's straight or right angle models of 360 Cycle Grinders are available in 21 speeds, from 3700 to 21,600 R.P.M. Thor furnishes complete equipment for demonstrations in your plant. Call your Thor factory representative. Thor Power Tool Co., Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 105

EDLUND-MATIC NUMERICAL TAPE CONTROLLED DRILLING & TAPPING MACHINE

The newest Layout Drilling Machine with Numerical Tape or Dial Control. Economically performs multiple operations for
Single Piece Layout Work
Short Run Production
The entire sequence of operations can be repeated time after time with no chance of operator error—minimizes operator attendance and skill.



FEATURES

- Flexibility in setting up a wide variety of operations.
- Quick conversion from one drilling job to another.
- Work from standard detailed drawings.
- Standard 1" 8 channel punched tape.
- Tape or Dial control.
- Infinitely variable spindle speeds 225-2700 rpm.
- Infinitely variable feeds 1 to 7 inches per minute.
- Nine different operations or tool changes at one setting.
- Foolproof tool rack (available) prevents use of incorrect tool

See this new Edlund machine at the National Machine Tool Exposition SPACE 531

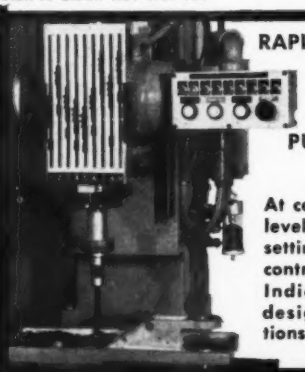
* PATENTS PENDING

CIRCLE INFORM-A-GRAM KEY NO. 106

Write for Bulletin 200.

CONTROL CONSOLE

Operation Selector Switch and Lights for nine operations
Spindle Speed and Feed Setting Knobs and Tachometers.
Table Positioning Dials for two axiis.
Zero Offset Dials.



RAPID ADVANCE AND FEED STOPS PLUS PENDANT PUSH BUTTON STATION

At convenient eye level for precision setting and easy control.
Indicator Lights designate operations.

EDLUND COMPOUND TABLE

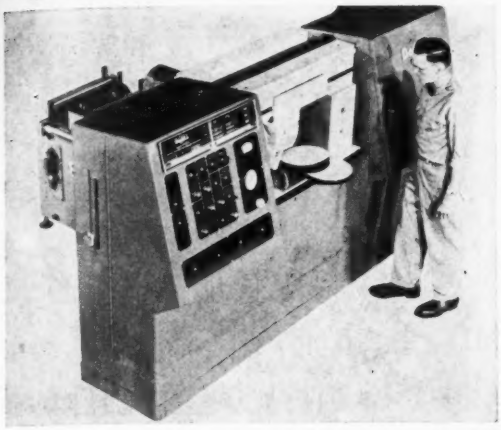
A new concept in extremely rapid positioning table. Many exceptional features. Table Travel 14" x 20". 200"/per min.

Special Contract Job work can also be arranged with Edlund. Send Part, Blueprint and Requirements.

EDLUND
MACHINERY COMPANY
Cortland, New York

EDLUND REPRESENTATIVE IN MAJOR CITIES

High Production Saw Twice As Fast



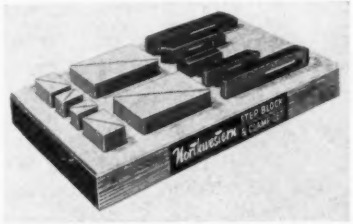
Designed for continuous high-production operation, this new power cut-off saw will cut two to three times faster than present power saws, including difficult-to-cut materials. The Continental has a capacity of 16″ x 20″, indexes automatically from 0 to 24″ in thousandths, and leaves a stub end of only 2½″. See it at The DoALL Co.'s Booth 528, Coliseum Machinery Show, or Circle Inform-A-Gram No. S65.

Molten Metal Pump

The "Gusher" Model 150 molten metal pump has a fully cooled shaft and bearings providing safety in handling liquids up to 1300°F. Motor capacity of the new pump is 1 to 3 hp. See it and other operating models of Ruthman Machinery Co.'s coolant pumps at Booth 376, Production Engineering Show, or Circle Inform-A-Gram No. S66.

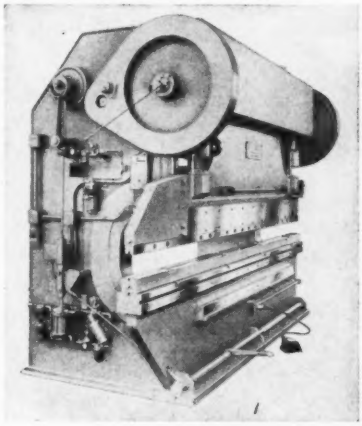
Aluminum Step Block Set

These aluminum step blocks have a minimum tensile strength of 45,000 psi. They're lightweight, non-magnetic, and cannot mar or scratch machine tool tables. Com-



plete sets reduce setup time and eliminate makeshift clamping. They'll be on display at Northwestern Tools, Inc.'s exhibit at Booth 416, Production Engineering Show. For details, Circle Inform-A-Gram No. S63.

Mechanical Press Brake

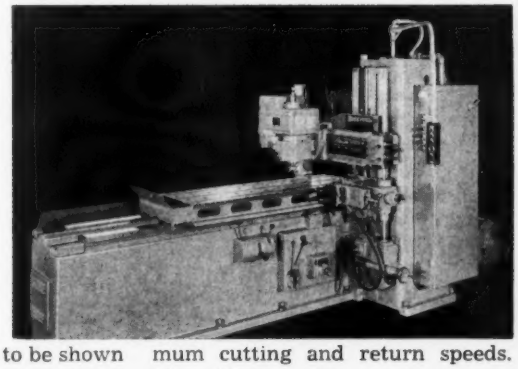


This 160-ton mechanical press brake has an air-operated clutch and brake and uses a high torque continuous duty punch press motor. It employs a motor-driven ram adjustment and overload protection is provided for at both ends of the machine. Throat depth is 18″ on this Model H3½-10 unit. It's one of four large metal cutting and metal forming machines to be exhibited by Steelweld Machinery Div'n, The Cleveland Crane & Engineering Co. at the Machine Tool Exposition. For more information, Circle Inform-A-Gram No. S67.

Simplified Machinery Mounts

See a complete line of mounts that simplify machine installation while affording maximum noise and vibration control at the Unisorb booth at the Production Engineering Show. Newest additions to the line are a small leveling model and a family of do-it-yourself mounts. Unisorb permits installation of any machine, even 450-ton presses, without the problems that go with bolting or lagging the equipment to the floor. For information, Circle Inform-A-Gram No. S64.

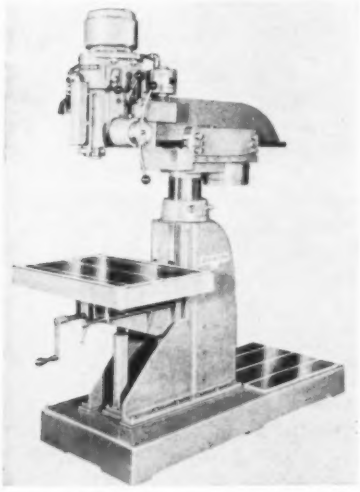
Shaper-Miller Combo



Among the machines to be shown by Rockford Machine Tool Co. at the Machine Tool Exposition is a new 72″ hydraulic openside shaper (illust.) that's fully convertible for shaping or milling. The shaper drive is a new 15-hp hydraulic circuit providing 200 fpm maximum cutting and return speeds. The milling head is a 3-hp all-gear driven design and has a 3″ quill adjustment. A roll forming machine, a tracer lathe, and a heavy-duty shaper-planer will also be on display. Get details at the booth, or Circle Inform-A-Gram No. S68.

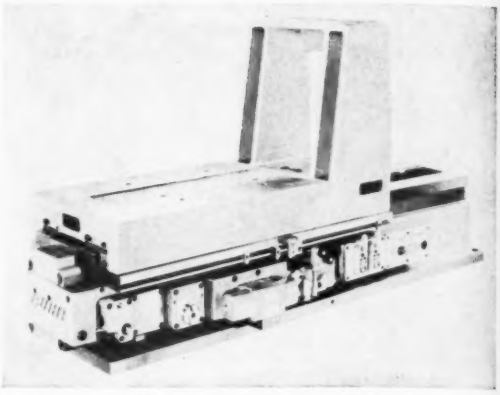
Time Saving Machines

Famco Machine Co. will unveil a numerically controlled mill, electro-hydraulic tracer controlled mill, hydraulic presses, and heavy-duty power shears at Booth 331 of the Machine Tool Exposition. Pictured is the numerically controlled milling machine which automatically guides the movement of the machine slides in the three axes, thus eliminating errors and limitations of manual positioning and machining. See these machines at the booth, write for literature, or Circle Inform-A-Gram No. S69 for details.



Building Block Units

Building block construction, based on the new machine tool standards, are features of the machines to be introduced by Buhr Machine Tool Co. at Booth 1440, Machine Tool Exposition. Included will be new hydraulic way type feed units which provide a 60% increase in rate of rapid traverse and a 50% increase in structural strength. Only three hydraulic lines are required from the tank to the unit. For more details, Circle Inform-A-Gram No. S71.

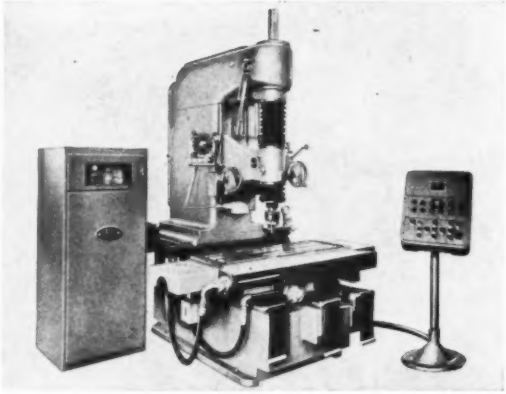


Gap Frame & OBI Presses

Featured in the L & J Press Corp. exhibit at Booth 1116 at the Machine Tool Exposition will be a 75-ton double-crank gap-frame press and six OBI presses. Designed specifically for handling large dies and wide stock, the gap frame press will be exhibited with 8-station transfer and roll feeds to illustrate its adaptability to tooling requirements. The OBI presses range from 14- to 125-ton capacities. Stop at the booth, or Circle Inform-A-Gram No. S72.

Tape Controlled Jig Borer

Introduction of the Model 65 numerically controlled jig borer will draw visitors to W. B. Knight Machinery Co.'s exhibit at Booth 824, Machine Tool Exposition. The table and saddle of the machine are driven by hydraulic cylinders and traverse simultaneously to reach each position in the shortest possible time with accuracy to tenths.



Setups are fast and easy because the work is located under the spindle by turning the micrometer dials of the zero offset. Rapid traverse for setup is controlled directly from pushbuttons without the use of tape or dials. The Sperry control system uses standard 1" wide, 8-channel tape. Circle Inform-A-Gram No. S70.

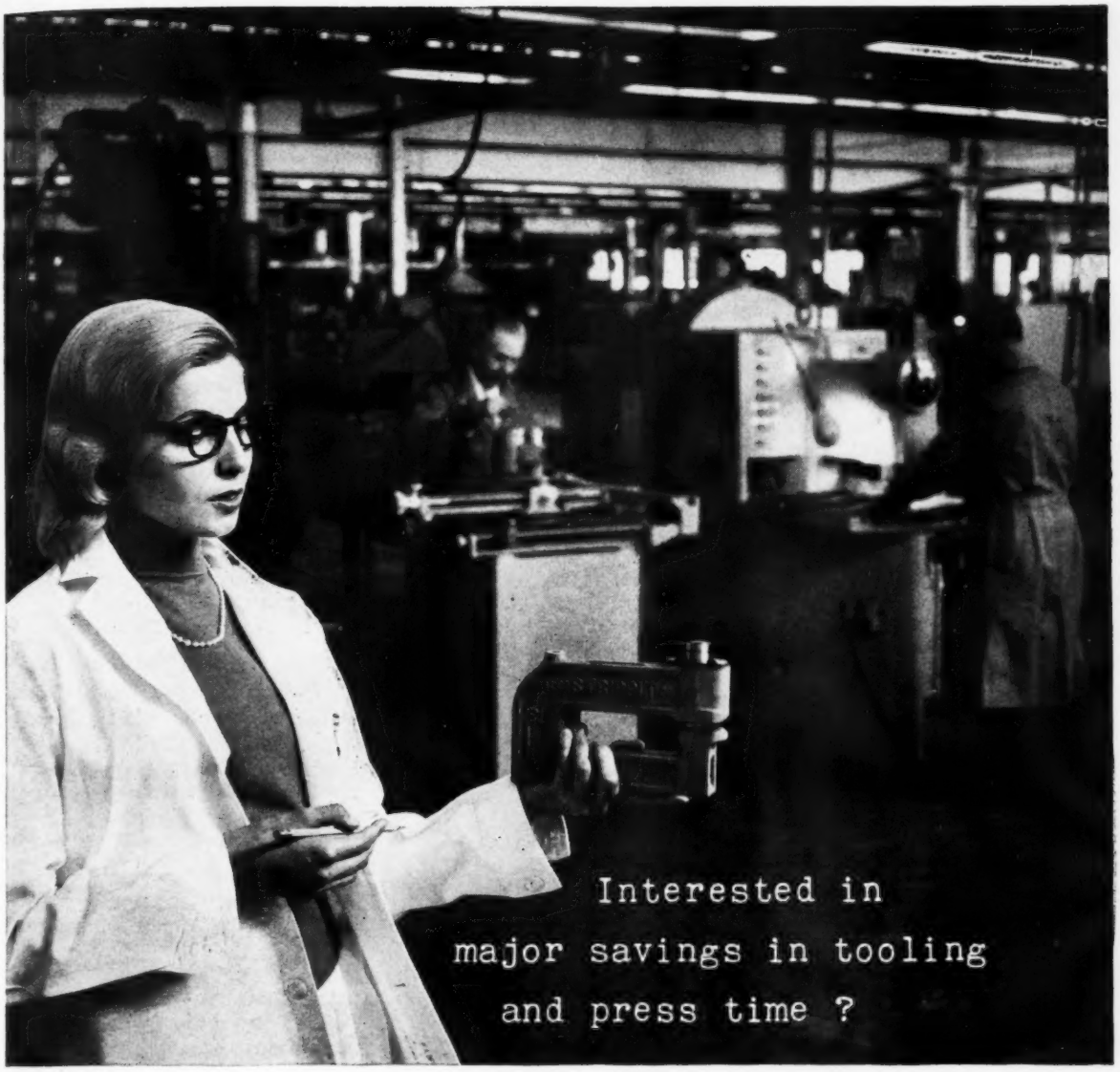
Quick Change Tooling

Tool change time is minimized with the versatile Kwiklok taper drive toolholder. Kwiklok provides a simple, highly accurate, dependable means for changing from one tool size to another in a matter of 2 or 3 sec. Used with adapters, these holders can handle almost any shank type tool. Tools are simply inserted in the holder and turned—clockwise for locking and counterclockwise for unlocking.

The taper-drive centers the adapter or tool and eliminates runout due to the metal-to-metal fit of the male and female sections. It also provides rigidity.

Falcon Tool Co., Detroit, makers of quick change toolholders, adapters, and cutting tools, reports that Kwiklok tooling is now enjoying use in tape controlled machines as well as conventional milling, drilling, and turning units.

The Edlund-Matic, the machine on the cover of this issue, makes use of Kwiklok tooling in an ingenious way. If the tool placed in the spindle agrees with the tape tool designation an electric circuit is closed allowing the machine to operate. For further information, Circle Inform-A-Gram No. S73.



Come to STRIPPIT - Booth 340 at Chicago's Navy Pier

You'll get a fresh slant on ways to work metal when you visit the Production Engineering Show in September. Stop by the STRIPPIT booth and see how our self-contained punching units eliminate expensive dies, how the Flex-O-Drill sharply reduces template making time, how our versatile Fabricators simplify pilot and production runs. SELF-CONTAINED HOLE PUNCHING UNITS reduce tooling to a simple assembly operation. Punches, stripping guides and die buttons are component parts of the unit. Nothing's attached to press ram. No die set required!

STRIPPIT FLEX-O-DRILL (left) speeds production of accurate templates and layouts. A table-top precision machine for drilling, reaming, center punching and scribing, Flex-O-Drill does away with need for base-line drawings or vernier height gauges. Handles ¼" material up to 24" wide and in any length. STRIPPIT MODEL 15A FABRICATOR (right), the latest model of one of industry's most versatile sheet metalworking machines, features the new Strippit Electro-Hydramatic Head for controlling the stroke. The time-saving Fabricator punches any sheet material up to ¼" thick, notches and nibbles up to ⅛" thick material.

If you can't make the show, be sure to write for the General Catalog explaining the STRIPPIT System.

WALES **STRIPPIT** INC.

212 Buell Road Akron, New York

In Canada: Strippit Tool & Machine Company, Brampton, Ontario; In Continental Europe: Raskin, S.A., Lausanne, Switzerland; In the British Isles: E.H. Jones, (Machine Tools) Ltd., Hove, Sussex, England.

CIRCLE INFORM-A-GRAM KEY NO. 109

Presses and Equipment

A complete automatic high production coil-fed press and auxiliary equipment will be the main feature of the Danly Machine Specialties, Inc. exhibit in Booth 1250 at the Machine Tool Exposition. The installation will feature a Danly 400-ton Autofeed press, complete with a slide cushion, a skiptype scrap cutter, a grip feed (adjustable while in motion), and a coil loading car.

A 100-ton OBI will also be displayed and will feature a static press control and eddy current drive control. Operating full and half models of the double-action underdrive press will also be seen. Literature is available, or Circle Inform-A-Gram No. S74.

Hydraulic Controls

Vickers Inc., Div'n of Sperry Rand Corp., will be exhibiting hydraulic power and control equipment for industrial machinery in Booth 107 at the Production Engineering Show. Highlighting the display will be a new Series SA4 electro - hydraulic servo valves with flow rates that cover the 0 to 37 gpm range. These low-priced units feature high response and excellent dirt tolerance characteristics.

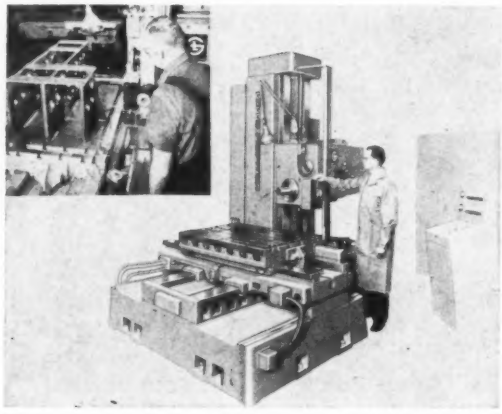
Also shown will be the "Building Block" electro - hydraulic servo systems a new traverse and feed panel, an adjustable deceleration valve, and a vane-type hydraulic pump series. For details, write the company, or Circle Inform-A-Gram No. S75.

Lead Screw Tapping Head

A new Auto-Tap lead screw tapping head that enables unskilled operators to produce precision tapped holes on any drill press will be introduced by Ettco Tool & Machine Co., Inc., Booth 247, Production Engineering Show. The Model 62 has a rapidly interchangeable lead screw, a sensitive cone clutch that runs in oil, and a positive depth control to assure perfect threads even in blind or recessed holes.

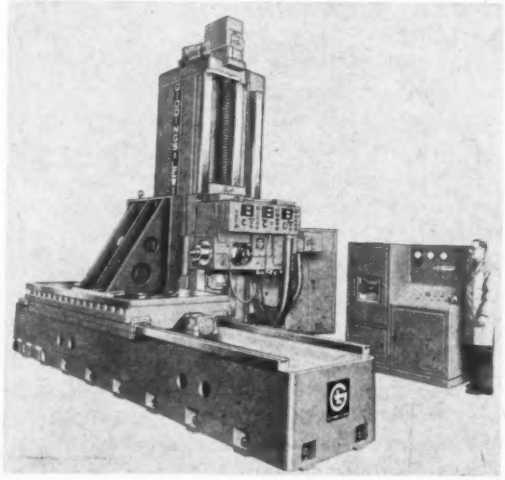
The tapping clutch reverses at approximately twice the speed of input, allowing high production rates. Tap breakage and scrap are minimized because the lead screw, not the operator, guides the tap in and out of the work with only the normal cutting load. Circle Inform-A-Gram No. S77.

Tape Control and Machine Tools



Two numerical control systems, Numeripoint punched paper tape discrete positioning control and Numeripath magnetic tape path control, and 15 machine tools will be featured by Giddings & Lewis Machine Tool Co. at the Machine Tool Exposition. One of the products to be at Booth 1320 is a No. 3 jig borer and milling machine, which will demonstrate jigless boring and heavy face milling.

Another, the No. B-20 DiMil, is an all new horizontal contour milling machine equipped with Numeripath magnetic tape control system. It will demonstrate forging die sinking with numerical control. A horizontal boring, drilling, and milling machine; radial drills; and vertical turret lathes will also be shown by Gisholt. For information, Circle Inform - A - Gram No. S76.



Want details on these products? Use T & P's Inform-A-Gram Card opposite page 100

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WHY WAIT?

DELIVERY FROM STOCK

SPECIAL RH & LH HIGH SPEED

TAPS • DIES • THREAD PLUG & RING GAGES

NEW SIZES ADDED DAILY . . . IF NOT LISTED—WRITE

DEALER INQUIRIES INVITED

WHEN REQUESTING QUOTATIONS ALWAYS MENTION QUANTITIES

SIZE	THREADS PER INCH
0000	160
000	120
00	90-96-112
0	56-64-72-76-80-90
1	48-56-60-64-80-90
2	48-52-54-56-60-72-80-96
3	36-40-60-64-72-80
4	30-32-38-42-44-56-60-64-72-80-90
5	22-27-30-32-36-38-42-48-50-56-60-64-72-80
6	24-28-30-36-38-42-44-48-56-60-64-72-80
7	28-30-32-34-36-38-40-44-48-64
8	24-26-28-30-38-40-44-48-56-60-64-72-80
9	24-28-30-32-36-40
10	18-20-22-26-28-30-34-36-40-48-56-60-64-72-80-96
11	20-22-26-27-30-32-36-40
12	20-22-26-27-30-32-36-38 40-48-56-60-64-72-80
13	20-22-24-28-32-40
14	14-16-18-26-28-30-32-36-40-64
15	18-20-24-28-32-40
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20	14-16-18-20-24-32
22	16-18-20-24
24	14-16-18-22-24
26	14-16-20-24
28	14-16-20
30	14-16-20
1/16	56-60-64-72
5/64	56-60-64-72
3/32	32-36-38-48-50-56-60-64
.100	100
.107	52
7/64	36-40-42-44-48-50-56
1/8	30-32-36-38-40-48-56-60-80
.132	50
9/64	30-32-38-40
.148	38
5/32	24-26-28-30-32-36-38-40-50
11/64	24-26-30-32-36-38-40
3/16	12-18-20-22-24-26-27-28-

SIZE	THREADS PER INCH
3/16	30-32-36-40-48-56-64-72
.198	24
13/64	24-28-30-32-36-40
7/32	20-22-24-26-27-28-30-32-36-38-40-56-60-64-72
.227	24
15/64	20-22-24-28-32-36-.246-40
.246	40
1/4	10-12-14-16-18-22-23-24 25-26-27-30-32-36-38-40-48-50-56-60-64-72-80
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.277	40
9 32	16-18-20-24-26-27-28-32-36-40-46-56
19/64	18-24
.300	28
5/16	10-12-14-16-20-22-26-27-28-30-32-36-40-44-48-50-56-64
21/64	16-18-20-24-36
11/32	16-18-20-22-24-26-27-28-32-36-40-64
23/64	16-24
.365	28
3/8	10-12-14-18-20-22-26-27-28-30-32-36-40-44-48-56-64-72
25/64	14-16-18-20-24-27-32-40-48
.402	24
13/32	12-14-16-18-20-24-27-28-32-36-40
27/64	14-20-24-28-32-36
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31/64	13-20-24-32
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17/32	10-12-13-14-16-18-20-24-27-28-32-40-64
.550	24
9/16	10-13-14-16-20-24-26-27-28-30-32-36-40-48-56-80
37/64	10-12-18-20-27
19/32	12-18-20-24-28-32-36-40

SIZE	THREADS PER INCH
5/8	9-10-12-13-14-16-20-24-26-27-28-30-32-36-40-48-56-64
41/64	11-18-24-32
21/32	10-11-18-20-24-27-32-40-48
11/16	10-11-12-14-16-18-20-22-24-26-27-28-30-32-36-40
23/32	11-12-16-18-20-24-27-32-36-40
47/64	10-12-16-18-20
3/4	6-8-9-11-12-14-15-18-20-22-24-26-27-28-30-32-36-40-48-60-72
49 64	10-16-18-20
25/32	10-12-16-18-20-24-27-32-40
.800	16
13/16	8-10-12-14-16-18-20-24-27-28-32-40
.835	16
55/64	6-12
27/32	9-10-18-20-24-27-32-40-48
.850	14
7 8	8-10-11-12-13-16-18-20-24-26-27-28-30-32-36-40
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31/32	8-9-12-16-18-20-24-28-32
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1-3/32	7-8-9-12-14-16-18-20-32-40
1-1/8	8-10-14-16-18-20-24-27-28-32-40-48
1-5/32	7-8-9-12-14-16-18-20-24-32
1-11/64	18
1-3/16	7-8-10-12-14-16-18-20-24-27-28-32-40
1-1/4	8-10-14-16-18-20-24-27-28-32-40
1-5/16	6-7-8-10-12-14-16-18-20-24-27-28-32-40-48
1-3/8	5-8-10-14-16-18-20-24-27-28-32-40
1-13/32	12-16-18-20
1-7/16	6-8-10-12-14-16-18-20-24-27-28-32-40

SIZE	THREADS PER INCH
1-1 2	7-8-9-10-13-14-16-18-20-24-27-28-32-40
1-17/32	7-12-16-18-20
1-9/16	6-8-10-12-14-16-18-20-24-32-40
1-5/8	5-5½-6-8-10-11½-12-13-14-16-18-20-24-28-32-40
1-11/16	8-10-12-14-16-18-20-24-32
1-23/32	5-8-12-16-18-20
1-3/4	5-6-8-10-12-13-14-16-18-20-24-28-32-40
1.767	18
1.7715	12
1-13/16	8-10-12-14-16-18-20-24-32
1-7/8	5-8-10-12-14-16-18-20-24-32
1-29/32	12-16-18-20-32
1-15/16	8-10-12-14-16-18-20-24-32
2	4½-6-8-10-12-14-16-18-20-24-28-32
2-1/16	8-10-12-14-16-18-20-24-32
2-1/8	4½-8-10-12-14-16-18-20
2-3/16	8-10-12-14-16-18-20-24
2-1/4	4½-8-10-12-14-16-18-20-24
2-5/16	8-10-12-14-16-18-20-24
2-3/8	4-8-10-12-14-16-18-20-32
2-7/16	8-10-12-14-16-18-20
2-1/2	4-6-8-10-12-14-16-18-20
2-9/16	8-10-12-14-16-18-20
2-5/8	4-8-10-12-14-16-20-32
2-11/16	8-10-12-14-16-18-20-32
2-3/4	4-8-10-12-14-16-18-20-32
2-7/8	4-8-10-12-14-16-18-20-24-32
2-15/16	8-10-12-14-16-18-20-32
3	3½-4-8-10-12-14-16-18-20
3-1/16	4-8-10-12-14-16-20
3-1/8	4-8-10-12-14-16-20
3-3/16	4-8-10-12-14-16-20
3-1/4	4-8-10-11-12-14-16-18-20
3-3/8	4-8-10-12-16
3-1/2	4-8-10-12-16
3-5/8	4-8-10-12-16
3-3/4	4-8-10-12-16
3-7/8	4-8-10-12-16
4	4-6-8-10-12-16
4-1/8	4-8-10-12-16
4-1/4	4-8-10-12-16

Many more sizes in stock up to 6" dia.

LEFT HAND N.C. (USS)—N.F. (SAE) SIZES

SEE ABOVE SECTION FOR MORE SIZES

SIZE	THREADS	SIZE	THREADS	SIZE	THREADS	SIZE	THREADS
0	80	8	32-36	7/16	14-20	1"	8-12-14
1	64-72	10	24-32	1/2	13-20	1-1/8	7-12
2	56-64	12	24-28	9/16	12-18	1-1/4	7-12
3	48-56	14	20-24	5/8	11-18	1-5/16	6-12
4	36-40-48	1/4	20-28	11/16	11-16	1-3/8	6-12
5	40-44	5/16	18-24	3/4	10-16	1-7/16	6-12
6	32-40	3/8	16-24	7/8	9-14	1-1/2	6-12

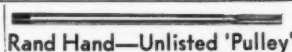
'OVERSIZE' and 'UNDERSIZE' TAPS

RIGHT AND LEFT HAND N.C. AND N.F. SIZES

MACHINE SCREW	#2 to #5	Plus or Minus .002, .003, .005
MACHINE SCREW	#6 to #14	Plus or Minus .003, .005, .010
FRACTIONAL	1/4" to 1-1/2"	Plus or Minus .003, .005, .010 .015, 1/64, 1/32

Right & Left Hand—Unlisted 'Gun' or Spiral Pointed Taps

Size	Threads	Size	Threads
0	80 NF		
1	56 NS	7/8	9 NC, 14 NF
2	56 NC, 64 NF	1	8 NC, 12-14 NF
9/16	12 NC, 18 NF	1-1/8	7 NC, 12 NF
5/8	11 NC, 18 NF	1-1/4	7 NC, 12 NF
11/16	11 NS, 16 NS	1-3/8	6 NC, 12 NF
3/4	10 NC, 16 NF	1-1/2	6 NC, 12 NF



Rand Hand—Unlisted 'Pulley' And Extra Length Taps

Size	Threads	Size	Threads
4	36-40 NC, 48 NF	3/8	24-NF
5	40 NC, 44 NF	7/16	20 NF
6	32 NC, 40 NF	1/2	20 NF
8	32 NC, 36 NF	9/16	12 NC
10	24 NC, 32 NF	9/16	18 NF
12	24 NC, 28 NF	5/8	18 NF
1/4	28 NF	3/4	16 NF
5/16	24-NF	Also Larger Sizes	NC & NF

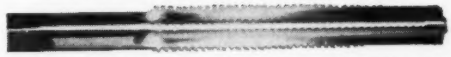
UNLISTED Right Hand "Pipe" Taps

"NPT" Taper "NPT" Size	Thread	"NPS" Size	Thread	EX. LENGTH "NPT" & "NPS" Size	Thread
1/16	27	1/16	27		
1/4	27	1	8		
		1-1/4	11½		
2-1/2	8	1-1/2	11½	1/16	27
3	8	2	11½	1/8	27
3-1/2	8	2-1/2	8	1/4	18
4	8	3	8	3/8	18
Also British		3-1/2	8	1/2	14
		4	8	3/4	14
		Also British		1	11½
				Also British	

Lefthand 'Pipe Taps' Taper and Straight

Size	Thread	Size	Thread
1/16	27	1	11½
1/8	27	1-1/4	11½
1/4	18	1-1/2	11½
3/8	18	2	11½
1/2	14	2-1/2	8
3/4	14	3	8
Also British		3-1/2	8
		Also British	

ACME TAPS IN STOCK

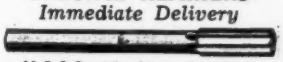


IF NOT IN STOCK—7 to 10 DAYS DELIVERY—When ordering or requesting quotations, kindly furnish following information:

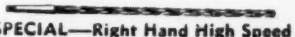
(a) Kind of material being machined.
(b) Depth of hole in inches, through or bottom.
(c) Tap to be used horizontally or vertically.
(d) Will tap turn, or is piece expected to be turned.
(e) Is tapping job expected to be done in one pass.
(f) Would tap be backed out of hole, or machined stopped for release of tap.
(g) If possible, submit thread length, and overall length of tap desired with blue print.

SPECIAL REAMERS

Immediate Delivery



H.S.S.S. Machine Reamers Decimal, Fractional, Letter, and Wire Gauge Sizes Prices On Application



SPECIAL—Right Hand High Speed "EXTRA LENGTH DRILLS" "AND LEFT HAND DRILLS" In Stock for Immediate Delivery

Get all 3 . . .
- ☑ DELIVERY
- ☑ QUALITY
- ☑ PRICE

at

FIELD TOOL SUPPLY CO.

Industrial Cutting Tools

31 S. DESPLAINES ST., CHICAGO 6, ILL.

All Phones: Financial 6-1195

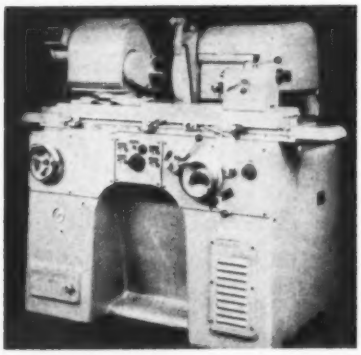
The Largest Stock of SPECIAL and STANDARD TAPS, DIES, PLUG GAGES

CIRCLE INFORM-A-GRAM KEY NO. 111

Punch Press Line

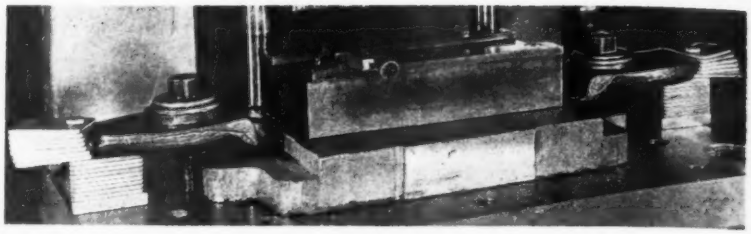
At Booth 1120 of the Machine Tool Exposition, Walsh Press and Die Co. will exhibit three punch presses. The 28-ton OBI flywheel punch press with variable speed drive, 60 to 80 spm capacity, and suitable for secondary and continuous operation, and the 38-ton air-clutch high-production fully-automatic punch press, will be in operation. Not in operation will be the 65-ton back-geared punch press. For details on these, Circle Inform-A-Gram No. S78.

High Precision Grinder

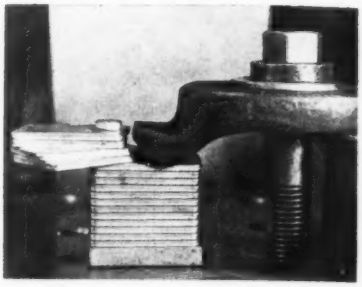


A high precision, fully automatic cylindrical grinder, Olivetti Model R4-300P/Y, can be pre-set to grind within 0.000050″ to a positive stop without in-process gaging. It includes an 8-speed automatically braked headstock; the machine ways are hand scraped and automatically lubricated.

A semi-automatic universal grinding machine featuring new electric gaging equipment, high speed sensitive precision drill presses, and electric gaging accessories will also be shown by Olivetti Corp. of America at Booth 609 at the Coliseum Machinery Show. For details on the products, Circle Inform-A-Gram No. S79.



Adjustable Riser Blocks Contribute to Accuracy and Profits



Now, thanks to Handy Products, you don't have to scrounge through a junk box for clamping block makeshifts. Too much valuable time can be lost while searching through such a hodge-podge of odds and ends for just the right size and shape.

Handy Products has just introduced their new, patented, adjustable riser blocks. Used in pairs, as illustrated, they have infinite uses in setting up work on drill presses, stamping presses, milling machines, surface grinders, shapers and planers. Their use will save you time and money.

Each adjustable block consists of sixteen steel leaves which can be fanned out in steps of 0.125″. They offer a total height, including base, of 2⅜″.

Handy Products' Adjustable Riser Blocks offer safety and convenience compared to haphazard, junk box methods.

Circle Inform-A-Gram No. D2 for details, price, and delivery.

Special in next month's Tooling & Production—

Many Feature Articles on press dies and stampings

More on the production use of Ceramic Tools

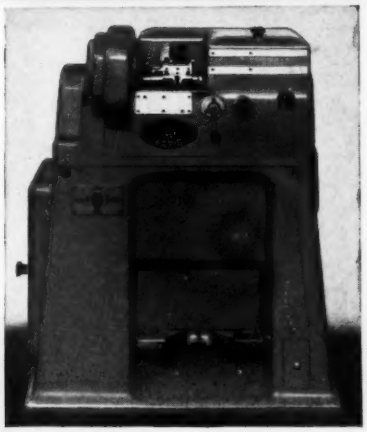
Watch for the October Issue

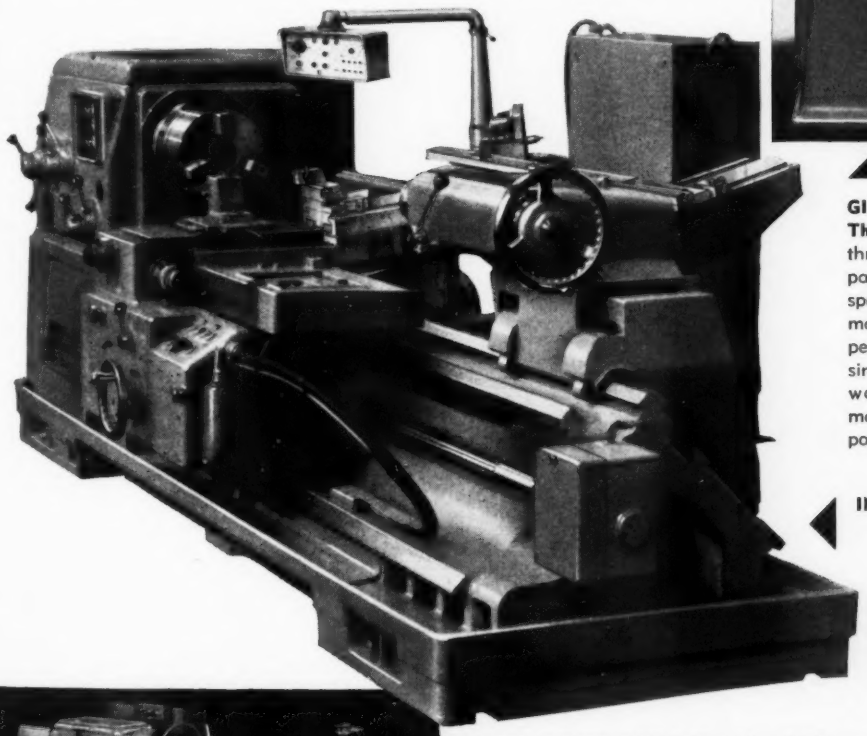
YOU *save money* by threading with CRI-DAN

SEE for yourself the advantages CRI-DAN offers:

- Low Tooling Cost — single-point carbide tool eliminates costly taps, dies, thread milling cutters and thread grinding wheels;
- Speed — dramatic time savings through fast automatic cycle and fast, simple setup;
- Precision — all types of work and materials — single- and multiple-start, coarse or fine, straight or tapered, left- or right-hand, internal or external — right up to shoulders.

GISHOLT BOOTH 518
second coliseum machinery show

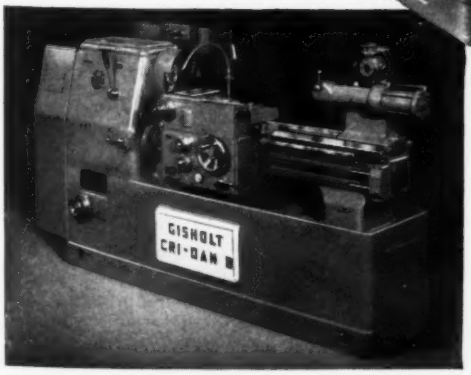




GISHOLT CRI-DAN A Threading Lathe — for threading small precision parts at peak production speeds. The carbide tool makes up to 150 passes per minute! The operator simply loads and unloads work, controlling the machine from a sitting position.

INTRODUCING—the GISHOLT CRI-DAN FT-80 Threading and Turning Lathe

For the first time see one machine perform threading, turning, facing, boring, tracing and cut-off, using single-point carbide tools throughout, in one fast automatic cycle.

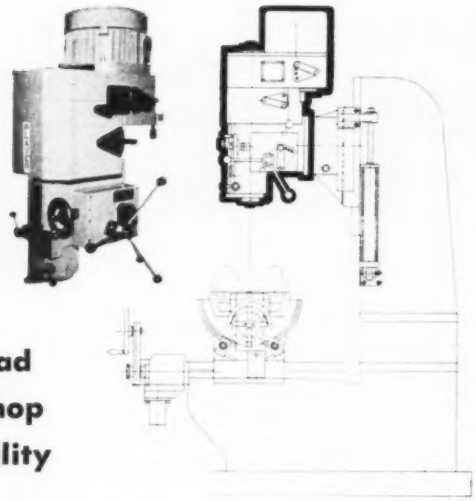


GISHOLT CRI-DAN B Threading Lathe — demonstrates 15-minute setup; threading and tracing of high-tensile bolts and related parts; versatility for all types of work and materials at production rates far above those possible with thread milling or thread grinding.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers (R) • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

CIRCLE INFORM-A-GRAM KEY NO. 113



A Boring-Mill Head . . . for small shop versatility

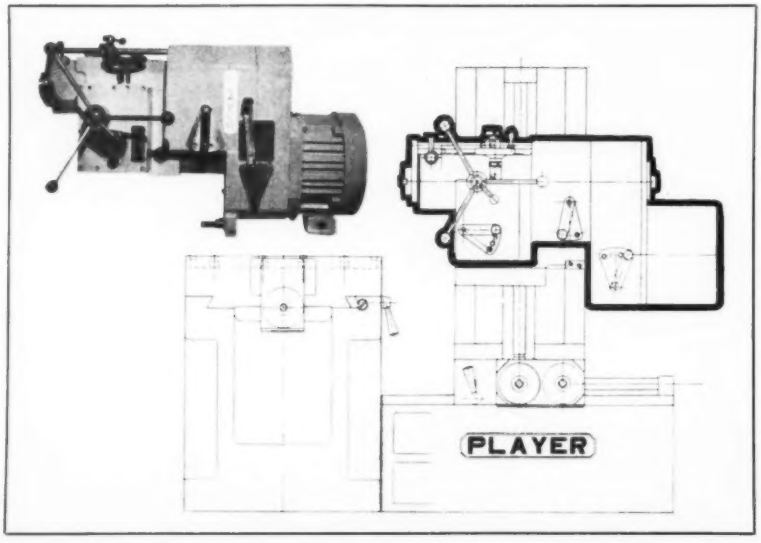
The small shop more than ever needs machining and equipment versatility. There is no doubt but what standardization and the building block machine trend is strengthening this segment of our industrial backbone. Further in this direction, Joseph Player is furnishing boring mill heads for special machines.

Specs for these units are:

Speed rpm	**68-2400**
Spindle hp (st'd)	**3**
Quill dia	**5-3/16″**
Quill travel (powered)	**6″**
Nose taper	**40**
Bolt circle	**2-5/8″**
Bolt size	**½-13**
Flange dia	**3½″**

The head is constructed for use in a horizontal, vertical or angular position. However, intended use must be specified as mounting facilities are different.

Many accessories are also available for use with these heads as well as other standard components for unusual and special performance machines. Automatic actuation has been anticipated and is easily arranged. For further information, Circle Inform-A-Gram No. D3.



Book Reviews . . .

STANDARD SHEET AND STRIP METAL TOLERANCES, published by the Pressed Metal Institute, 3673 Lee Rd., Cleveland 20, Ohio, 1960, 54 pages, $1.75.

As specified by mills and warehouses, this publication covers the accepted industry tolerances for the major metals, ranging from carbon steel to beryllium, used in stamping operations. It should be handy as a reference tool for both designers and buyers of stampings.

HEAT TREATMENT OF HIGH STRENGTH STEELS FOR AIRFRAME APPLICATIONS, by R. J. Fiorentino, A.B. Roach, and A. M. Hall. Published by Defense Metals Information Center, Betelle Memorial Institute, Columbus 1, Ohio. 116 pages.

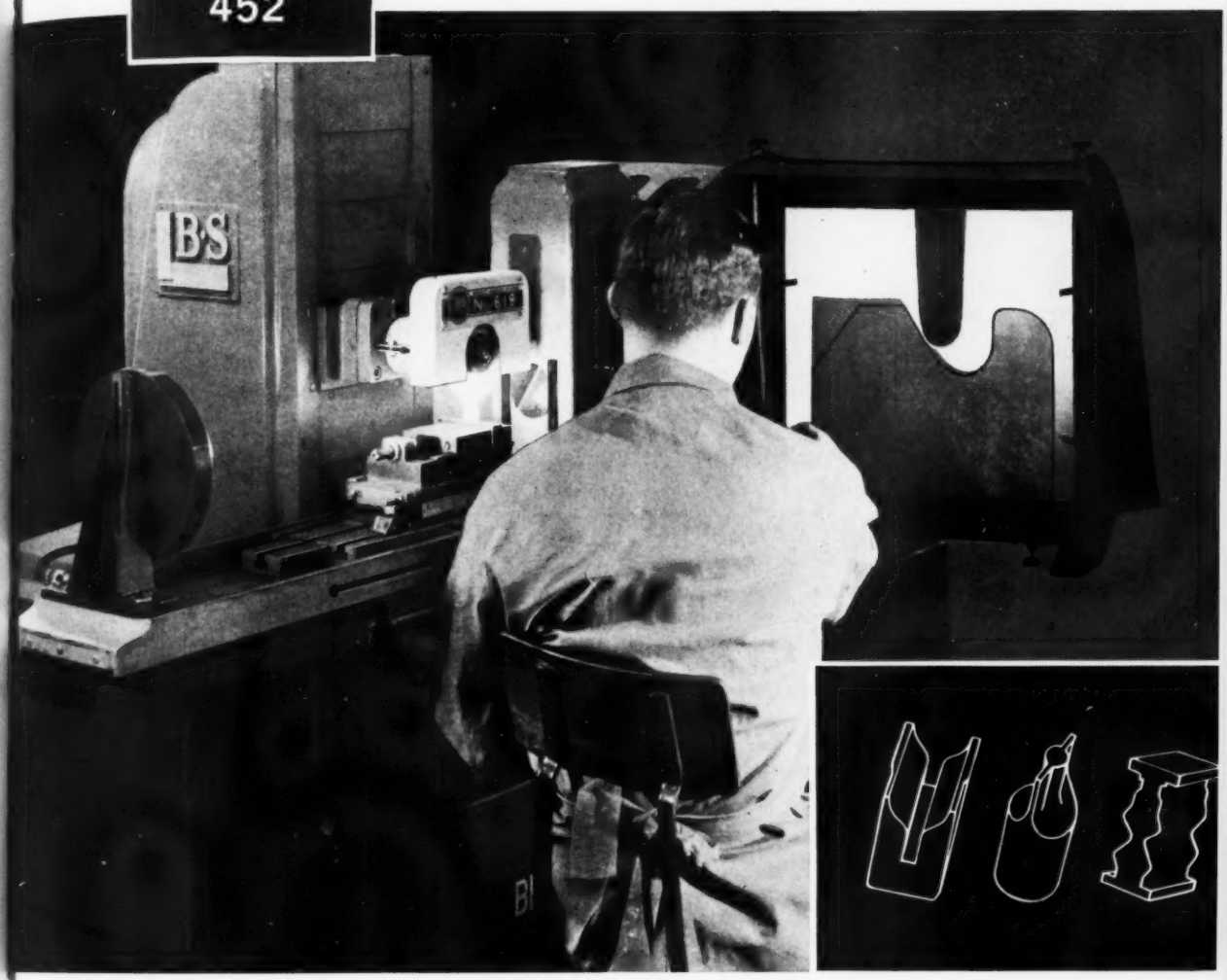
A substantial portion of the information contained in this report was obtained in conferences with four steel producers and 24 consumers, augmented by suppliers' data sheets and published literature. Seven classes of high-strength steels were covered in the survey which prompted this report from the Center: low-alloy hardenable engineering metals, hot-work die steels, martensitic stainless steels, martensilic precipitation-hardenable stainless steels, semiaustenitic precipitation-hardenable stainless steels, and cold-rolled austenitic stainless steels.

METALWORKING'S MECHANICAL PRESS HANDBOOK. Published by Metalworking Magazine, 221 Columbus Ave., Boston 16, Mass., 1960, 256 pages, $5.00.

This handbook, while being basic and easily understandable, should be of use in most stamping plants because of its comprehensiveness. The 15 chapters begin with a description of press types and capacities, and advance through transfer and high-productivity models. The latter are presses equipped with automatic feeders for continuous operation.

See what's new at Booth 452

TO HELP YOU GRIND MORE FOR LESS



Up to 300% faster form grinding in carbide, ceramics – Brown & Sharpe MICROMASTER with VISUAL GRIND

VISUAL GRIND, the built-in comparator on the B&S 618 Surface Grinding Machine, permits tool and die makers to meet today's demand for intricate shapes in super-hard materials with spectacular savings in work hours and wheel costs.

Skilled operators can save up to 300% in set-up and grinding time. There is no need to remove work for frequent inspection with separate equipment. Semi-skilled workers, also, quickly learn to "follow the line," and match the clearly visible, true image of the work to the form layout drawn on the screen. Wheel costs are drastically reduced in grinding carbide and ceramics — any contours can be reproduced with a few simple wheels.

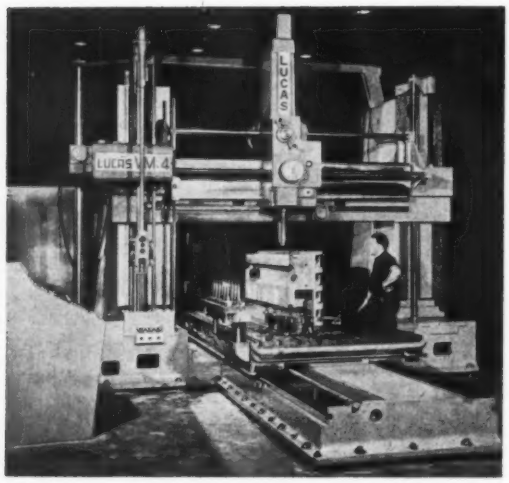
An unlimited variety of forms can be produced in punches, dies, and similar work — with through, blind, or template grinding — using standard equipment and simple attachments.

The MICROMASTER® with Visual Grind provides all the extra profit-saving advantages of the new B&S 618 Surface Grinder. It can be readily used for other grinding, of surfaces up to 6" x 14", without disturbing the optical system.

THE VISUAL GRIND® system is manufactured by The Cleveland Grinding Machine Co. and is sold only by Brown & Sharpe. For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

Brown & Sharpe PRECISION CENTER

CIRCLE INFORM-A-GRAM KEY NO. 115



New N-C Machine Has Big Bed, Vertical Head

TEAMWORK OF THE machine tool builder, the numerical control manufacturer, and the user has produced a new numerically controlled vertical boring, drilling, and milling machine. The Versa-Tronic handles work up to 132" long, 78" wide, and 72" high and its control permits tape selection of 42 different feed rates, 25 spindle speeds, and rapid traverse of 75 ipm, as well as automatic changing of up to 84 different tools.

The team effort began when Eimco Corporation in Salt Lake City considered methods for drilling and tapping a one-piece 3600 lb cast steel frame for the tractors they produce. They needed a machine with the flexibility of a radial drilling machine, the accuracy of a jig borer or horizontal boring mill, and the size of a medium range planer type milling machine.

Lucas Machine Division of the New Britain Machine Co. undertook the job of building such a machine. General Electric designed a control system for it using the Mark III Numerical Positioning Control. The result is an automatic, versatile, large capacity machine which will work to repeatable accuracies of ± 0.0002". The new Versa-Tronic is expected to save Eimco 88% of the time formerly needed to produce tractor components.

The machine has a long cast bedway supporting the sliding table. The cross-rail moves up and down parallel to the table, and the vertical spindle head moves crosswise on the rail.

It can be operated in any of three modes: Manually, from the pendant station; electrically, through decade pushbuttons on the operator's console; or completely automatically using standard 1" punched-tape control.

Automatic tool changing is greatly simplified because no tool-carrying arms or mechanical linkages are required. Tools, ranging from ¼" drills to 14" milling cutters, stand upright in a "pigeonhole" magazine mounted to the side or on the surface of the work table. An orienting control stops the spindle rotation always at the same point, so drive keys in the spindle will line up with keyways of the tools in the storage position in the magazine.

The tool is secured by a Lucas Power Tool Lock and Ejector built into the spindle. A draw collet in the spindle is cycled open by the automatic control to receive an adapter on the tool, then closed to wedge-lock it in place, ready for subsequent operations.

Book Reviews . . .

BASIC GRAPHICAL KINEMATICS, by Harold B. Kepler. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y., 1960, 314 pages, $6.00.

The first chapter of this text defines kinematics as that division of mechanics which is the study of motion without regard to the forces that cause it. Subsequent chapters relate this study of forces to machines in a graphical approach that avoids involved mathematics. The traditional topics of kinematics are covered: displacement, velocities, accelerations, cams, gears, chains, and belts.

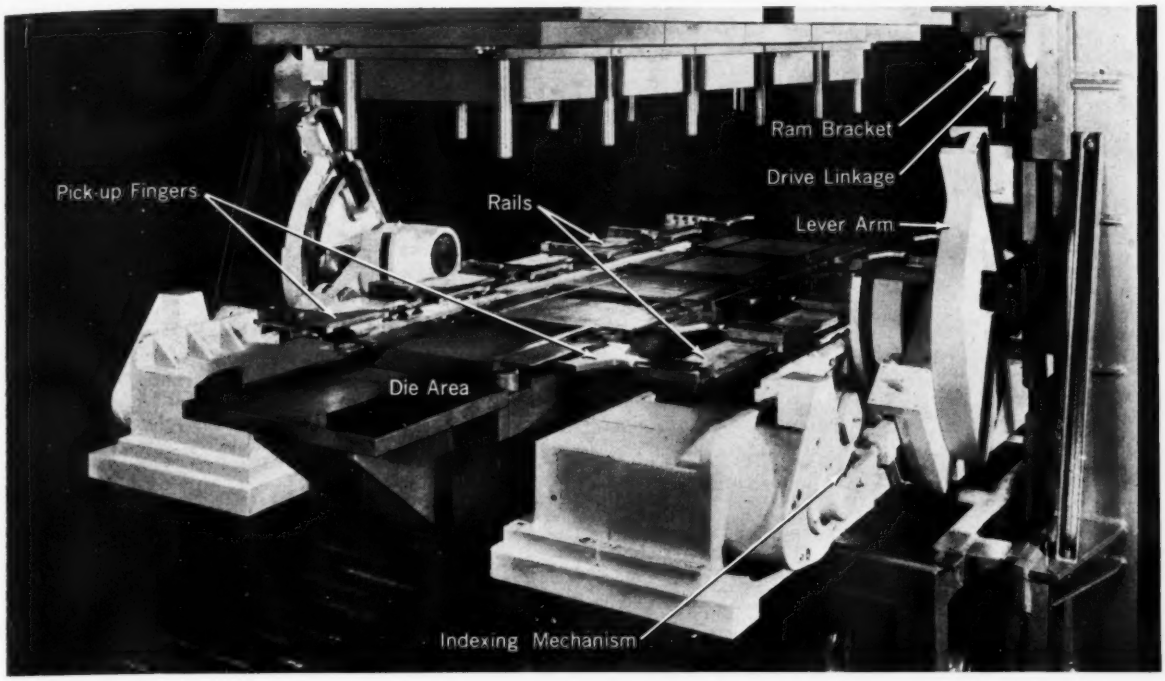
NATURE AND PROPERTIES OF ENGINEERING MATERIALS, by Zbigniew D. Jastrzebski. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1959. 571 pages, $11.

The author, professor of chemical engineering at Lafayette University, has provided a close link between the basic sciences of chemistry, physics, and engineering practice with this book. It considers the basic concepts of interatomic and intermolecular forces and their relationship to the structural characteristics of both crystalline and amorphous materials. The characteristic properties of metals, creamics, and related materials are treated in detail.

Steel Marketing Setup

A program for marketing a new family of high strength, heat-treated steels through a nationwide network of independent steel service centers has been announced by Great Lakes Steel, Div'n of National Steel Corp.

Available in a wide choice of constructional grades in strength levels up to 110,000 psi or abrasion-resistant grades up to 500 Brinnell hardness, the steels can also be heat-treated to specific end-use hardness and strength requirements.



Automate your presses... for BIGGER profits!

Increase your production, improve the quality of your products and get your manufacturing costs down—with your present equipment.

This happy position is being enjoyed now by users of Sheffield PRESS-PACERS—demountable transfer devices which automate any straight side press or line of presses. Parts can be transferred from die to die in one press, or between presses in lines up to more than 125 feet long.

One press can be made to do the work of as many as five or six presses, reducing equipment and space requirements. The number of transfer operations is limited only by the capacity of the press or line of presses involved. Automatic handling from press to press prevents scrap generated by manual handling.

PRESS-PACERS are completely flexible. They have been tooled to handle interchangeably as many as seven parts. Model or engineering changes do not obsolete a PRESS-PACER—they only increase its value.

Blanks, pre-drawn parts, sheet and coil stock may be used, as desired. Feed fingers are interchangeable—feed distance is adjustable.

Sheffield provides complete single-source responsibility in PRESS-PACER production including (1) design and build tooling, (2) building of standard PRESS-PACER, (3) provision for minimum scrap and scrap removal, and (4) installation in your plant, warranted to perform to specifications and your satisfaction.

You can see eight different PRESS-PACER installations right in your plant by means of a sound movie in color—and discuss your opportunity for savings with a factory engineer . . . write, wire or phone Contract Manufacturing Division.

The **SHEFFIELD** *Corporation* *Dayton 1, Ohio*

A subsidiary of The Bendix Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

CIRCLE INFORM-A-GRAM KEY NO. 117

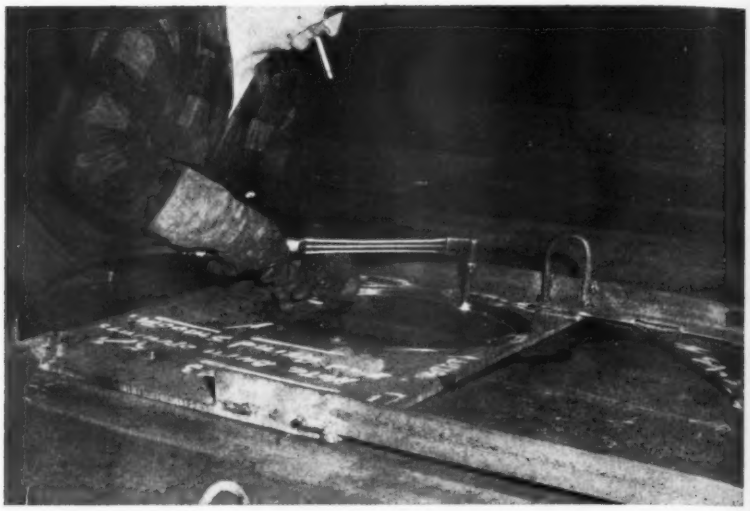


Fig. 1. This shows manual burning of the 13" x 17" elliptical hole, using a guide template.

Lend a Hand to speed up production

AUTOMATION MAY BE IMPORTANT to productivity, but all facilities do not all lend themselves to automation. So, in areas where manual operation is a necessity, look to technique improvements to up production.

Flame cutting is one of these areas where few procedural changes have been made — this is especially true in the low production shop. It must be granted that where there is little room for improvement any improvement may be significant.

Here pressure vessels are made from 7/16" thick rectangular plate 66" wide and 133" in developed length. Each plate contains four 1-9/16" dia holes for entrance pipes, two ovate holes for pipes entering at an angle, and one 13" x 17" elliptical manhole. These are flame cut in the flat, after which the plates are rolled to 42" dia cylinders and seam welded prior to fitting the heads.

Plates were first trimmed and bevel-burned on a flame planing machine for the proper weld-joint. They were then moved to a multiple-torch shape-cutting-machine where all holes were burned automatically with the aid of a template. The operator moved the guideheads from location to location against the template. However, the machine's thickness cutting range permitted burning only one plate at a time, which was no contribution to speed. Of even greater import was the fact that the plates had to be moved in order to get all holes in.

To eliminate movement of plates, which are fairly large and heavy, it was decided the holes should be cut with a torch, manually. They are now hand cut, using a template as a guide. The template is actually three plates, held together with angles. It has guide holes and stops to position the part.

Note the tacked-on blocks at the large elliptical hole; these serve as stops for the torch and leave 2" long "bridges." These are to minimize distortion during subsequent rolling operations.

Manual placing of the fixture, burning the holes, and removing the fixture is easily accomplished while other plates are being cut to size and beveled.

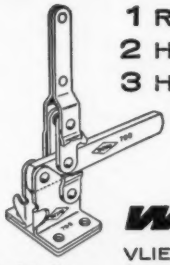
—Clement F. Brown

Fig. 2. Fixture here is being removed after all hand burning. It's much easier to move than the part.

There's a WESPO clamp or plier for every clamping job!

80 models and sizes...

made better three ways to give more positive holding, last longer!



1 Reamed holes
2 Hardened serrated bushings
3 High tensile strength rivets

send for free catalogs describing Wespo clamps and fixture details

WESPO DIVISION
VLIER ENGINEERING CORPORATION
Formerly West Point Manufacturing Company
26935 W. Seven Mile Road • Detroit 19, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 119

HERE'S PROOF OF PERFORMANCE

"the spindle capacity, 'beef' of the machine, and ease of operation are really impressive . . ."*

RONNINGEN MANUFACTURING COMPANY

Big hole-thru-spindle capacity (3 1/16" in 17" lathe — 2 1/16" in 15" lathe — 1 9/16" in 13" lathe) is only one of the *plus value* features you'll find in Clausing-Colchester lathes. Here's a partial list of the many more:

- **geared-head drive powered by multiple V-belts**
- **totally enclosed head and quick-change gear box, oil bath lubrication**
- **multi-splined shafts and gears**
- **large tapered roller bearings, with oil flow lubrication . . . *most accurate bearings known to industry***
- **high-tensile steel spindle, hardened tapered nose**
- **separate rod for power feeds**
- **induction hardened, precision ground bed ways**
- **precision construction throughout to American standards of toolroom lathe accuracy.**

*The result — this user report is typical: "We like everything about our Clausing lathes. The spindle capacity, 'beef' of the machine, and ease of operation are impressive. The finish we get is phenomenal. And, you just can't beat Clausing geared-head lathes for value!" Ronningen Manufacturing Company.

NO OTHER LATHE GIVES YOU SO MUCH FOR SO LITTLE!

13" cabinet base models, including motor and controls, start at $2302; 15" cabinet base at $3221; 17" at $5070. You owe it to yourself to investigate Clausing-Colchester before investing in any lathe.

See It In Action At the COLISEUM MACHINERY SHOW in Chicago

CLAUSING

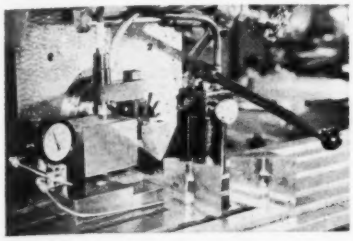
CLAUSING DIVISION
ATLAS PRESS COMPANY
9-118 NORTH PITCHER ST., KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 120

Hydraulic Clamping Handles Heavy Cuts

Versatile hydraulic fixturing has replaced mechanical clamping devices used in the slab milling of four sides of die steel blocks after the top and bottom surfaces are ground parallel.

Two Newton hydraulic clamps hold the work against the bottom rails of the fixture and against the side rail for squaring with sufficient force to slab mill ¼" from the



rough die block in one pass. After the first surface is milled it is used against the side rail to align the block for milling of the second side. The third and fourth sides are also milled using the previously milled surface for squaring.

Clamping is positive and repeatable and holds the block securely using no wrenches, or hammers. The hydraulic fixture is also used for many other jobs and its components can be re-used for building other fixtures.

New Cutting Tool Plant

The Q-T Tool Co. of Bedford, Ind., has announced the completion of new manufacturing facilities for the production of standard and special cutting tools. Managed by Wilfred Rytknen, the modern 10,000 sq-ft one-story building has rail and truck facilities for overnight service to almost all major midwest industrial centers.

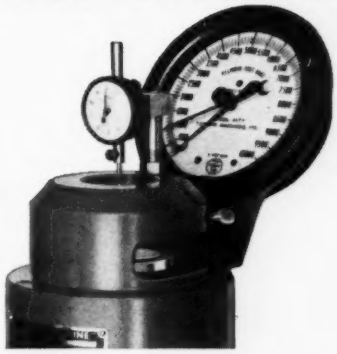
Names Changed

Because all phases of flame spraying are now being handled by Metallizing Engineering Co., Inc., the company has changed its name to Metco, Inc., to include this broader field.

The company name change to Hi-Shear Corp., replacing Hi-Shear Rivet Tool Co., was prompted by diversification of products.

Save Time—Save Labor—Save Material

with Steel City Ductility Testers



Test incoming material for drawing qualities to be sure it will do the job for which you bought it and you'll avoid scrap and eliminate costly wasted effort. How? With a Steel City Ductility Testing Machine. Two concentric pistons do the job. Outer piston grips test piece against head; inner piston makes the cup. Gripping and load application are automatic. Piston speed is easily adjustable.

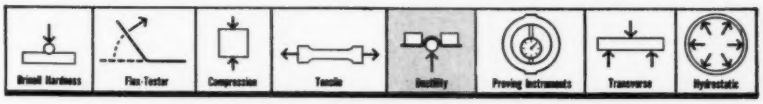
Distributors in most major metalworking areas

Steel City Testing Machines Inc.

8815 Lyndon Ave., Detroit 38, Mich.

Available in two compact floor models for thicknesses up to ⅛" and ¼", and a bench model for thin metals 0.001" to 0.062". Hydraulic capacities up to 40,000 lb. Specimens up to 4" wide tested with ease. Depth indicator incorporates friction brake to hold readings. Easy-to-read load gage has maximum-indicating hand. Write for detailed specifications.

Write or call Steel City if you have any special testing problems



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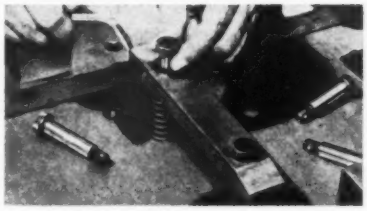
CIRCLE INFORM-A-GRAM KEY NO. 1212

Self-Locking Screws Solve Tooling Problems

There's not a screw loose in bumper dies used by Ford Motor Co.'s Metal Stamping Division. The company specified self-locking fasteners on the dies to eliminate the need for constant retightening of screws on slides and wear plates. The self-locking screws now used require only periodic checking without the danger of die damage due to broken screws.

Compressible nylon pellets are used in the fasteners to insure positive holding power despite shock and vibration. Seated in a small recess near the fastener point, the Nylok pellet compresses as the screw is inserted in a tapped hole or nut, forcing mating threads together for positive gripping. The screws are reusable repeatedly, will stay locked at any depth and need not be seated.



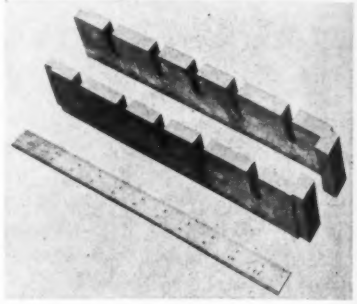
In another application of self-locking fasteners, Pratt & Whitney's Machine Tools Division solved a serious problem putting Nylok set screws on all set screw-jacked, wedge-equipped milling cutters. The problem arose because of trouble caused by loose screws on a set of inserted-tooth milling cutters used for milling and slotting of alloy steel heat treated to Rc 38-43.

One or two wedge elevating screws are used to keep the individually-mounted cutter blades in place. By locking the wedges securing the teeth, the screws provide a handy means for releasing teeth so they can be set out and resharpened. A typical slotting and side-milling cutter might be resharpened every 4 hrs, with blades taking as many as 20 regrinds during their life. Now that the company uses self-locking set screws on the cutters, the operation is trouble-free.

Long Blanking Punch Has Long Life

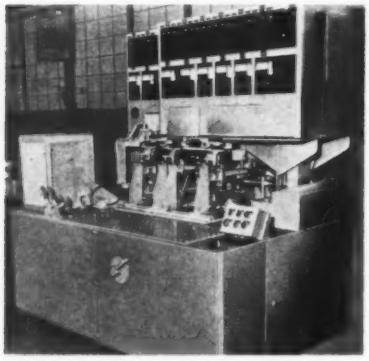
The longest one-piece blanking punches ever produced by Kennametal Inc. are setting performance records in producing large silicon steel laminations for ballast-type transformers. Advance Transformer Co. is getting 700,000 hits/grind with the 11½" long carbide punches and expects to get 50,000,000 or more hits with 75 grinds, each removing 0.010".

Advantages of the one-piece construction of the punches are in holding laminations to specified size, lengthening punch life and runs between regrinds, reducing downtime for cleaning and realigning punch sections, and eliminating the possibility of jagged laminations from separation of multiple-section punches.



Electronic Gaging

Dimensions of axle shaft forgings are checked on a new Radio Corporation of America electronic gaging system using standard off-the-shelf gaging modules. The machine checks the shaft for run-out and out-of-roundness as well as OD and length. The flange is inspected for thickness and run-out in reference to the shaft.



It operates at 600 parts/hr and automatically classifies axles as acceptable or rejects, the latter in six categories. Sizes handled range from 28" to 33" in length and 6" to 8" in flange dia.

The control panel gives a continuous visual presentation of the operation at all times.

Finish First, Draw Later

Deep drawing of pre-finished parts is now possible with a vinyl-metal laminate developed in the laboratories of the Simoniz Co. Produced by the new Clad-Rex 102 process, it can be worked by conventional equipment to severe configurations, and won't de-laminate when exposed to high temperatures. The abrasion resistant material doesn't require special handling and can be assembled directly after it is formed and trimmed without the need of finishing operations.

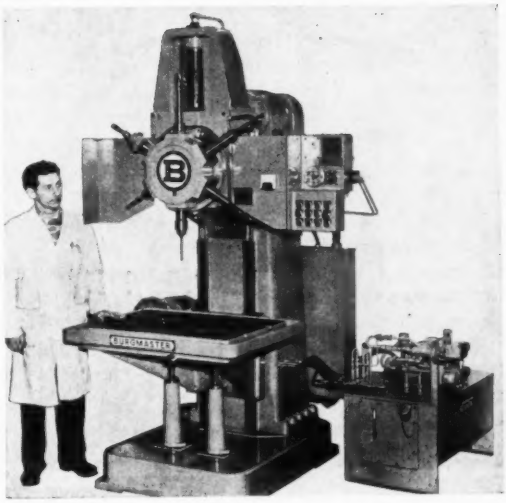
It can be drawn to depths up to nine times greater than the corner radius without fracturing the metal or de-laminating. This compares to the usual depth to radius ratio of 6:1 with 24 ga steel.

The new laminated sheet withstands elevated temperatures for extended periods of time without the need of post curing or annealing between forming and trimming. Formed sheet is given a standard test at 200°F for 4 hrs.

Parts drawn to a 6:1 ratio have been cycled at 100% humidity at 100°F for 24 hrs, cooled to −70°F for 4 hrs, heated to 160°F for 16 hrs, and finally placed in a weatherometer for 4 hrs. After 20 such cycles, the formed parts showed no signs of cracking, crazing, or loosening of the metal-vinyl bond.

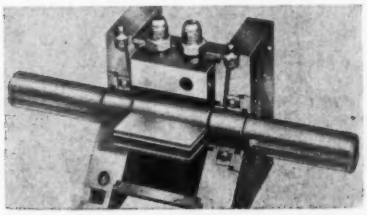
Turret Drilling Machine

For precision drilling, reaming, tapping, boring, and counterboring, use Model 25 AH automatic hydraulic Burgmaster 6-spindle turret drilling machine. It drills and taps 1¼" in steel and is accurate within 0.0005". Its new features include direct constant-positive hydraulic feed with dial set. Write Burg Tool Mfg. Co., Inc., 15001 S. Figueroa St., Gardena, Cal., Circle T1.



Oscillating Motors

For clamping, indexing, valving, camming, feeding, and lifting, use this line of compact pneumatic and hydraulic oscillating motors with instant full torque. Available



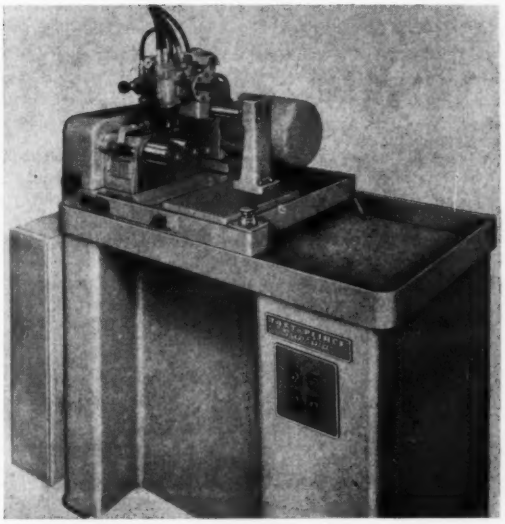
in single or double vane types, standard units will produce torques from 100 to 430,000 in-lbs. For details, contact Roto-Tork Mfg. Co., 23919 Little Mack, St. Clair Shores, Mich., or Circle T4.

Tool-Cartridge System

Wesson Co.'s interchangeable cartridge system with throwaway inserts for special tools is undergoing some changes. First, cartridge designs have been standardized in five basic styles which will take care of the vast majority of all applications for the system. Also, standard cartridges are now available to other tool manufacturers and to tool users who wish to design and produce their own tool bodies.

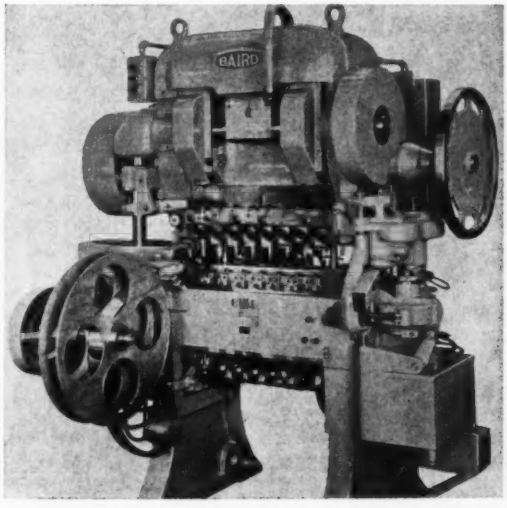
Microstoning Machine

For high production finishing of small parts, use the new centerless plunge cut microstoning machine. Supfina No. 86 is designed to operate with a fully automatic work cycle and finishes up to 2" long and from ⅜" to 1⅛" dia workpieces. Contact Taft-Pierce Mfg. Co., Mechanic Ave., Woonsocket, R.I., for details, or Circle T3.



Transfer Presses

New design changes have been incorporated in the Baird multiple transfer presses for producing stamped and drawn parts at close tolerances from roll stock. They include longer ram strokes, an electric clutch brake, a roll feed, and Empco-bronze bushings. Contact The Baird Machine Co., 1700 Stratford Ave., Stratford, Conn., Circle No. T2.



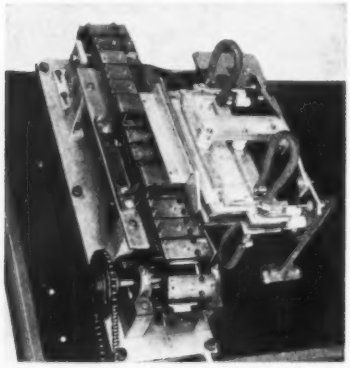
New Drill Package

A new two-in-one sales package has been introduced by Morse Twist Drill & Machine Co. for its line of jobbers drills to end the broken package problem of distributors.

The Split-Pak will be used to package drills in basic lots of twelve and six. By splitting the package down its perforated center, the distributor has two separate, but identical, sales packages containing six or three drills, depending on the basic size of the Split-Pak.

Hot Forming Unit Produces Plier Handles

Nine sizes of plier handles are formed and trimmed at rates up to 2640/hr on a new induction heating machine designed and built by Induction Heating Corp.



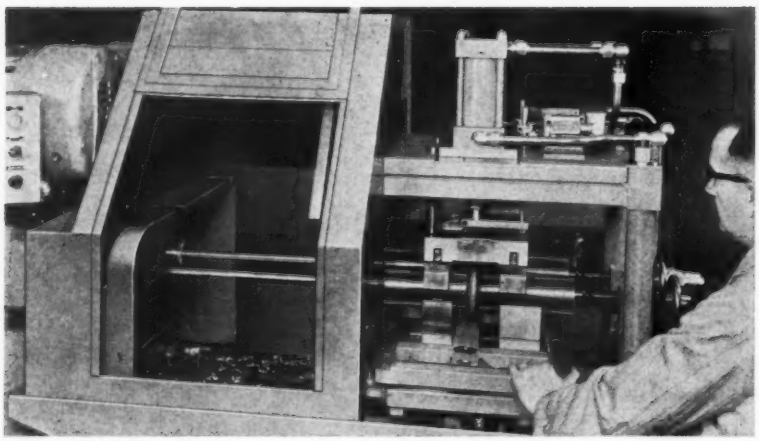
Parts are hung on holding pins at the right side of a semi-automatic conveyor and progress toward the left through a two-turn conveyor type work coil. As they leave the coil, the parts are stripped off the pins by wiping against the adjustable work cam located beneath the holding blocks.

The holding blocks were designed to be set up with the single pin down so that larger handles are held 2″ apart and processed at the rate of 800/hr. Smaller pliers are handled by simply loosening the center screw, rotating the block, and retightening the screw. The double pin end, now at the bottom of the block, holds the plier handles on 1″ centers.

A variable speed, sprocket and chain coupled transmission drives the conveyor. Different sprocket gear ratios are used for the larger and smaller handles.

The conveyor and coil are set up and powered from a new Ther-Monic C Series Model 2500, 25 kw output generator.

Deep Hole Drilled In A Single Pass



Drilling a 20½″ hole in a solid SAE 1045 steel forging is done in one pass using the Ex-Cell-O Bor-Drilling process. The 1 1/16″ dia holes are drilled in track roller shafts for heavy earth-moving equipment.

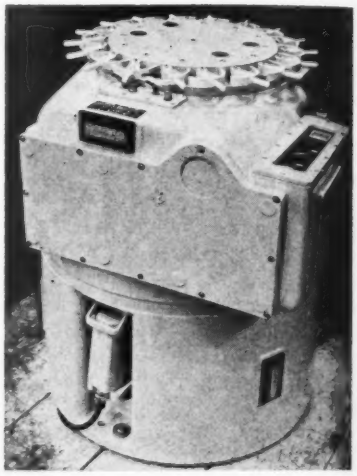
In operation, two parts are rolled onto an elevator and rough located in shallow grooves. The elevator, powered by a Rotac hydraulic actuator, then lowers causing the parts to nest into accurate V-blocks. End location against the pilot bushing is by hand wheels at the extreme right of the machine. Following these motions the parts are automatically clamped and the machining cycle begins.

The tools penetrate the solid material in one long, steady cut producing up to 50 parts/hr. Coolant is provided at 575 psi to lubricate and flush out chips.

Rotary Tables Guide Missiles

High accuracy non-optical Pratt & Whitney rotary tables, designed for use as azimuth indicators in missile aiming systems, can index from any point in 360° to any other point with an accuracy of ± 1.5 sec. In the missile application the tables will be equipped with optical devices and used to measure exact angular bearing from the North Star.

Degrees, minutes, and seconds are read directly on counter-type indicators. There are no optical scales or verniers, and errors due to individual interpretations are

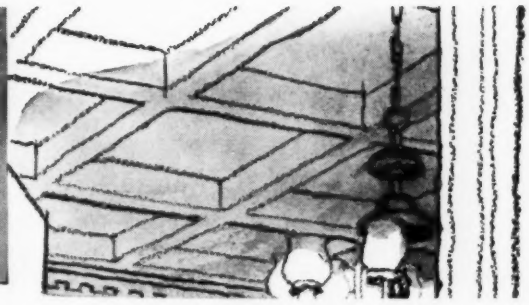


eliminated. A dual set of counters is used and is engineered so that "windows" never show half-turned numbers as counters go through the transfer stage.

The zero point can be set at any desired location within the full 360° of rotation by maintaining an existing reading and rotating the table to the position desired, or by maintaining a desired table position and moving the counter reading to zero. To insure positioning accuracy, the tables have warning lights that operate if correct procedures to remove backlash from the rotating mechanism have not been followed.

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 100 IN THIS ISSUE.

"We were taking the plan for granted"



"You know, Ed, it's so easy to take these things for granted. I knew we'd put in the Payroll Savings Plan a long time ago. So I just assumed we had a good, sizable number of our employees who were buying U.S. Savings Bonds regularly.

"Well, last week our chairman asked me for the exact figures. When I checked up I found we had less than a third of our people making regular use of the Plan. We needed to have someone explain—in person—the convenience and soundness of this fine thrift program.

"I contacted our State Savings Bonds Director right away. With his quick, friendly help we set up a thorough canvass of everybody on the staff. We found that many of our company family were just waiting to have someone tell them how simple it is to share in this sound, systematic thrift plan. Then the polite suggestion, 'And why not start now?' really did the work. Today we have a participation we're proud of, and we're taking steps to increase it still more, every payday."

Experience of leading companies shows that spreading Payroll Savings information through the organization, person-to-person, results in quick increases in participation. And that brings such welcome benefits as lower employee turnover, better safety records and the keen satisfaction of helping your people to contribute to our Nations Peace Power.

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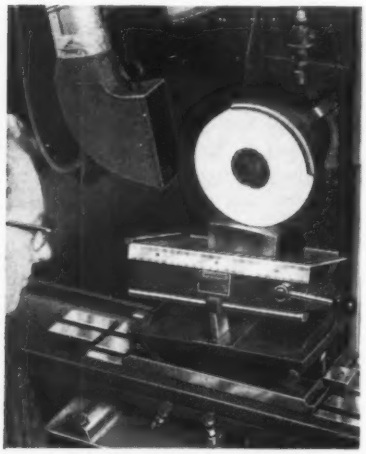
Catalogs and other helpful literature

For Precision Testing and measuring at any angle, use the magnetic base with precision test indicator, discussed in a bulletin. Ideal for machinist, toolmaker, inspector, and set-up man. Contact Koch Test Indicator for a copy, or Circle No. C1.

Relative Technical and economic advantages of finish grinding, honing, and lapping with natural diamond as compared with other abrasives are discussed in "Diamond Data" from Industrial Diamond Div'n, Engelhard Hanovia, Inc. For a copy, Circle No. C2.



MAGNA-SINE (Magnetic)

SINE PLATE (Non-Magnetic)

Speed, Accuracy, Savings on Every ANGULAR SET-UP

Robbins Angular Tooling Equipment Now Manufactured by EX-CELL-O

You can save hours of set-up time and be certain of accuracy on your angular grinding, other machining, and inspection operations with Robbins Magna-Sines and Robbins Sine Plates.

Any desired angle can be quickly and easily set up by using standard gage blocks. Referring to the handy Table of Constants supplied with each unit, it is simple to select the proper blocks. Accuracy of the set-up is then always to the gage block limits.

This simple, fast, sure method sets up all angles, single or compound, right or left hand, without V-blocks, angle plates or complicated "build-ups". Complete range of models and sizes in both magnetic and non-magnetic types puts Robbins precision equipment within the reach of every shop. Write now for complete catalog.

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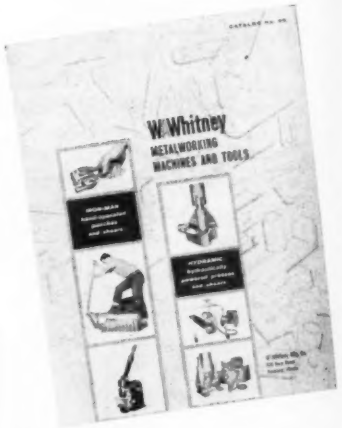
CIRCLE INFORM-A-GRAM KEY NO. 126

A 56-Page Catalog describes hydraulically-operated Hydramic presses. Data on portable and



bench-mounted hand-operated punches and presses are also included in Catalog 60 from W. A. Whitney Mfg. Co., or Circle No. C3.

Tough Tooling Jobs are handled by the 11B-3 Series air drills, introduced in a bulletin from Gardner-Denver Co., or Circle Inform-A-Gram No. C4.

A New Cutting Oil Chart gives the recommendations of leading oil companies for many types of steels and other materials. It's included in "Die Headlines," Vol. V, No. 3. from The Eastern Machine Screw Corp. For a copy, Circle No. C5.

For Producing Threads on pieces having flats, keyways, or slots, use the 5-Chaser Vers-O-Tool, introduced in 8-page Bulletin BV-1 from The National Acme Co., or Circle Inform-A-Gram No. C6.

A Double Tool Plate indexing machine chassis, Series MD, for automatic assembly and processing, is covered in a bulletin from Swanson-Erie Corp., which describes design and applications. Get a copy from the company, or Circle No. C7.

Pullmax Trimmers, that do a variety of metal forming and shearing operations, are covered in a bulletin which presents special attachments and applications. Get a copy from American Pullmax Co., Inc., or Circle Inform-A-Gram No. C8.

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Eliminate Tiresome Hand Operation!

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CIRCLE INFORM-A-GRAM KEY NO. 1271

NEW SUPER CYCLE POWER QUILLS

Extend your range of precision grinding, milling and finishing—step into high production with the new line of Precise Super Cycle Power Quills. These new units provide constant speed operation with no speed drop under load . . . run at speeds from 7,200 rpm to 60,000 rpm . . . assure excellent surface finishes, longer life for abrasive wheels and carbide midget mills. Rotor has no windings, no commutator — never needs servicing. Super Cycle Power Quills (with converters) are available in four basic models — provide up to 2 hp output at the chuck. All Super Cycle Quills are interchangeable with Precise Universal Motor Power Quills.

CONVERTERS—Self-contained, portable converters for Super Cycle System. Single, four-speed and continuously variable models.

Precise

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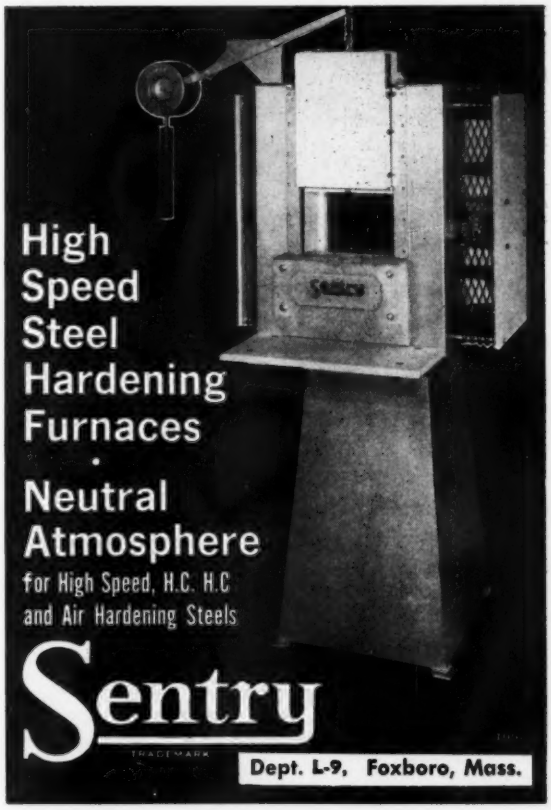

CIRCLE INFORM-A-GRAM KEY NO. 1273

Catalogs . . .

Precision Carbide Tool catalog and manual, No. 59, gives specifications for reamers, countersinks, burs, and end mills. Precision Carbide Co. supplies copies, or Circle No. C9.

A Portable Hydraulic Lift-Table is discussed in a bulletin that gives specifications and advantages. Bulletin 957 is available from Lange Lift Co., or Circle Inform-A-Gram No. C10.

Precision Grinders for toolroom and shop are presented in a bulletin that gives data on six hand- and power-feed models. Write Covel Mfg. Co. for Bulletin S60-1, or Circle No. C11.

A New Precision Bearing series is introduced in a bulletin that gives dimensions for these thin-width instrument types. Get a copy from Miniature Precision Bearings, Inc., or Circle Inform-A-Gram No. C12.

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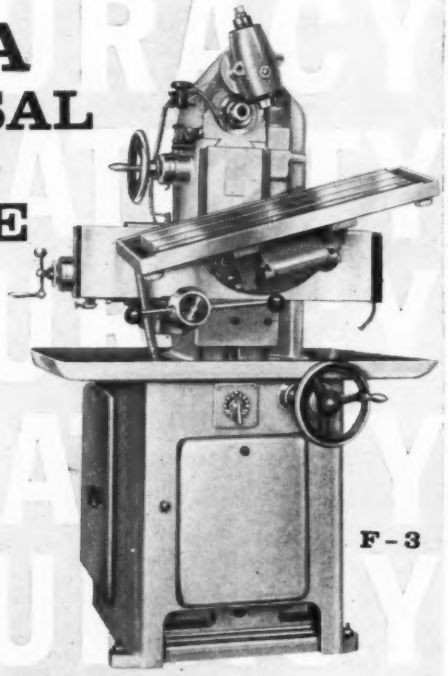
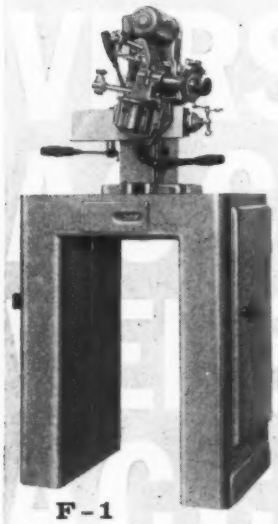


F-3



F-1

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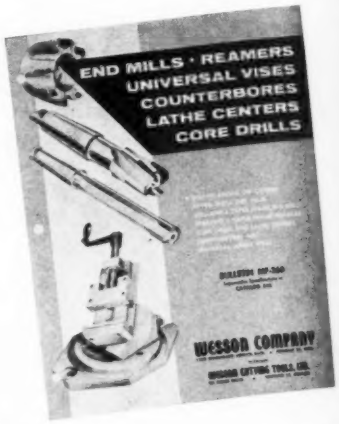


centers, and counterbores are detailed in Bulletin MF-360 from Wesson Co., or Circle No. C13.

Price Differences for seemingly identical die sets are discussed in the latest issue of "Die Set Digest," available from The Producto Machine Co., or Circle Inform-A-Gram No. C14.

"Multiple Nutsetters" gives the features of multiples and includes dimensional diagrams and data on different setups. Write Gardner-Denver Co. for Section 16, or Circle Inform-A-Gram No. C15.

Collets and Collet Fixtures for small part milling, drilling, and tapping are completely discussed in a bulletin available from Zager Inc., or Circle No. C16.

Industrial Applications for epoxy resins are detailed in "The Role of the Epoxy Resin Formulator in the Plastics Industry," available from Ren Plastics, or Circle No. C17.

Socket Cap Screws, Series 1960, are presented in a bulletin which includes tables giving dimensional and threading standards and concentricity limits. Write The Bristol Co. for Bulletin 773, or Circle No. C18.

Applications of Fatigue-Proof steel bars as machinery and equipment parts are detailed in Case Study Portfolio, No. 1 from La Salle Steel Co., or Circle Inform-A-Gram No. C19.

Catalogs . .

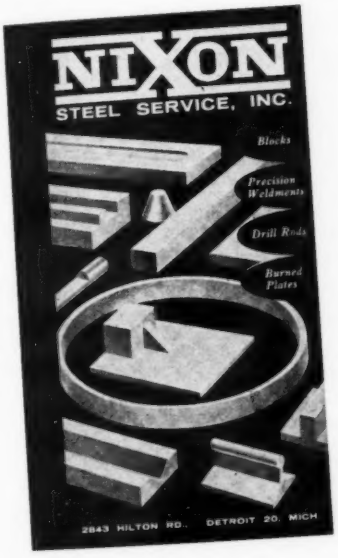
Drill Chucks especially designed for use on Moore jig borers are explained in a bulletin available from AMF Tool Div'n, American Machine & Foundry Co., or Circle Inform-A-Gram No. C20.

A Tube and Rod end-finishing machine bulletin discusses features of Model 660. Get Bulletin 401 from Pines Engineering Co., Inc., or Circle Inform-A-Gram No. C21.

Air Compressors, ¾-hp portable types, are featured in a bulletin that gives dimensions. Get a copy from National Compressor Corp., or Circle Inform-A-Gram No. C22.

Solid and Clad Precious Metals for industrial applications are discussed in Bulletin GP-22 from Texas Instruments Inc., or Circle Inform-A-Gram No. C23.

A 150-Page Stock List and steel pricing book has 17 indexed sections on cold rolled steel, blocks,



hot rolled flats, broach bars, die plates, high speed steel, etc. Contact Nixon Steel Service Inc., for a copy, or Circle No. C24.

The Ballizing Process for high-speed low-cost hole sizing and finishing is discussed in Bulletin B-46 from Industrial Tectonics, Inc., or Circle Inform-A-Gram No. C25.

A New 36-Page Catalog contains complete ordering data for precision punches and piercing accessories. Get Catalog 700 from Pivot Punch & Die Corp., or Circle No. C26.

Soft-Blank Top Jaws, made in several types for use on chucks having master jaws that are made to American standards, are described in a bulletin from DuPage Machine Co. Circle Inform-A-Gram No. C27.

A Cross-Slide Rotary Table for all milling machine operations is outlined in a bulletin. Features are listed. Get your copy from Morrison Machinery & Engineering Corp., or Circle Inform-A-Gram No. C28.

Greater Efficiency and accuracy is possible using the numerous modern tools, gages, fixtures, tables, etc. described in a catalog from Karl A. Neise, or Circle No. C29.

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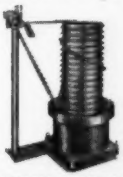
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BATTERY CHARGERS

CIRCLE INFORM-A-GRAM KEY NO. 129

Catalogs . .

"Magnesium in the Electronics Industry" outlines advantages of this metal for many applications. Write The Dow Metal Products Co. for a copy, or Circle No. C30.

Nine High - Velocity Machining applications using Kendex throwaway inserts made of Kentanium Grade K165 are featured in a bulletin from Kennametal Inc. Circle Inform-A-Gram No. C31.

Adjustable Speed Drives, Series 35, featuring modular construction, are discussed in a bulletin from Cleveland Machine Controls, Inc., or Circle Inform-A-Gram No. C32.

A Hot Work Tool Steel for severe applications is described and illustrated in a pamphlet. UHB Calmax's advantages, characteristics, and uses are given. Get a copy from The Uddeholm Co. of America, Inc., or Circle Inform-A-Gram No. C33.

"Tool Steels," a guide to the use of tool and die steels, is available from Climax Molybdenum Co., or Circle Inform-A-Gram No. C34.

Do-It-Yourself Castings for making machinist's and toolmaker's V-blocks, angle plates, etc., are offered in a bulletin available from Lambert Products Co., or Circle Inform-A-Gram No. C35.

Inspection, precision layout work, and checking of jigs and fixtures are handled by the Height Master height gage featured in a new brochure from United States Chemical Milling Corp. Circle No. C36.

Punched Hole Sizes for tapping screws are discussed in a bulletin that shows how they're punched, and gives recommendations and testing procedure. Get Data Sheet 60 from Dayton Perforators Inc., or Circle No. C37.

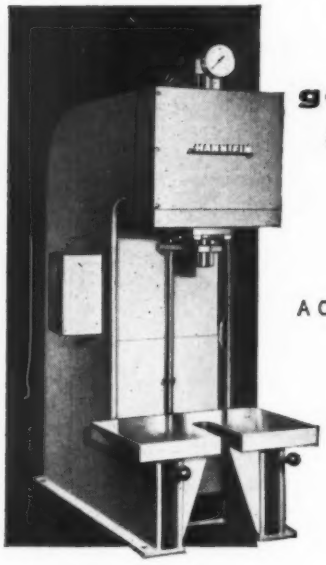
Throwaway Insert Milling Cutters and a new longer-life blade for Rigidcut milling cutters are described in Bulletin TA-7888 from Wesson Co., or Circle Inform-A-Gram No. C38.

An Automatic Tracer-Controlled Milling Machine with new electronic control is fully discussed in a bulletin. The BL-3622 Model C produces simple or complex shapes — dies, molds, and production parts. Contact Pratt & Whitney Co., Inc., for a copy of Bulletin 642, or Circle Inform-A-Gram No. C39.

Angle Nut Setters are discussed in a bulletin which explains design and operating features and gives specifications on a wide range of sizes. Get Section 16, Page 61 from Gardner-Denver Co., or Circle Inform-A-Gram No. C40.

Punched Hole Facts are given in a folder which includes data and prices for the new Pups punch line. This line meets 87% of the average user's need for ASTE heavy-duty head-type punches. Write Dayton Perforators, Inc., for Bulletin 457, or Circle No. C41.

A New Ratchet Wrench for applications requiring up to 150 ft-lbs torque, the Model 17B-515 is offered in a bulletin, Section 17, Page 51, from Gardner-Denver Co., or Circle No. C42.



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Catalogs . .

A New Diamond Wheel list price catalog covers diamond wheels, hones, and mandrels. Get a copy from Diamond Tool Research Co., Inc., or Circle No. C43.

A 16-Page Bulletin describes press equipment for pressure processing. It includes data on presses, dieing machines, die casting machines, and plastic molding machines. Write The Hydraulic Press Mfg. Co. for a copy, or Circle Inform-A-Gram No. C44.

Nine Scrap Choppers are offered in a technical bulletin, which also contains data on stock oilers. Get a copy from Durant Tool Co., or Circle Inform-A-Gram No. C45.

A Thread Guide offers a basic introduction to various thread types and defines terminology. Charts detail measurements, characteristics, and capabilities of the standard thread types. Get a copy from The H. M. Harper Co., or Circle No. C46.

"Internal Grinding Wheels" suggests grades for internal grinding and discusses advantages of each. Write The Cincinnati Milling Machine Co. for Bulletin PG-354, or Circle Inform-A-Gram No. C47.

"Newest Developments in Gear Honing" describes honing principles and features of a new machine. Brochure H60-6 is available from National Broach & Machine Co., or Circle No. C48.

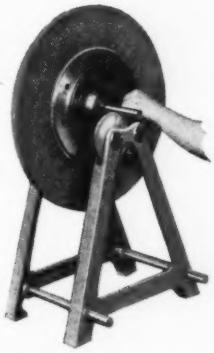
Automatic Forced Lubrication System, direct-drive spindle, and choice of left- or right-hand longitudinal feed are features of the Harig 612 surface grinder, described in a bulletin from Harig Mfg. Corp., or Circle No. C49.

Any Scheduling Operation, such as machine loading or dispatching, can be handled by the Cardogram systems discussed in a booklet available from The Graphdex Co., or Circle Inform-A-Gram No. C50.

Point - To - Point Numerically-Controlled positioning equipment by Pratt & Whitney Co., Inc. is highlighted in Bulletin 639. Write the company for a copy, or Circle Inform-A-Gram No. C51.

A New 20" Power Feed Drill Press line is presented in a bulletin that gives specifications for 18 models. Bulletin 100M is available from Rockwell Mfg. Co., Delta Power Tool Div'n, or Circle No. C52.

Balance...



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$6.75 (18") with high speed blades
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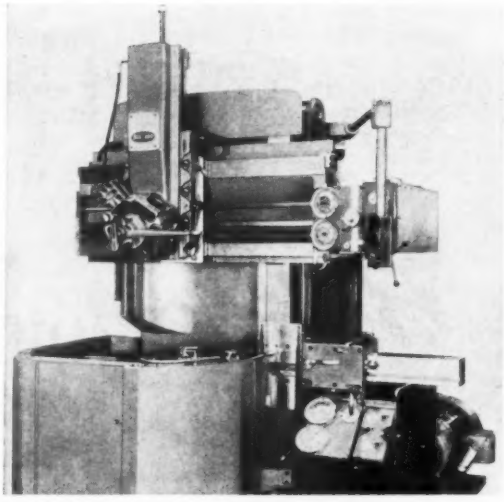
Rockford, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 131

Product News

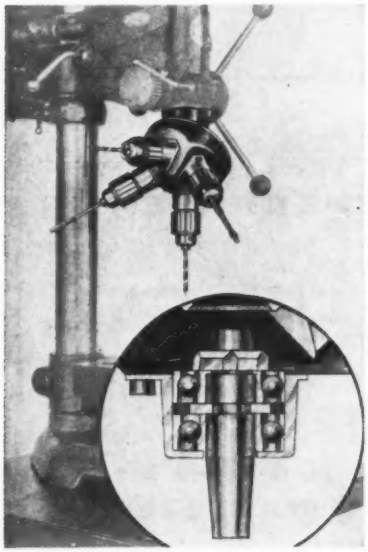
Machine Tool Control

A standard feature of all Bullard Dynatrol vertical turret lathes is Size - Au-Trol. It brings the cutting heads automatically to a stop when they reach preset positions during each operation. It's applied to internal boring, external turning, internal and external facing, and in machining blind holes. Write The Bullard Co., Bridgeport 9, Conn., for data, or Circle Inform-A-Gram No.P1.



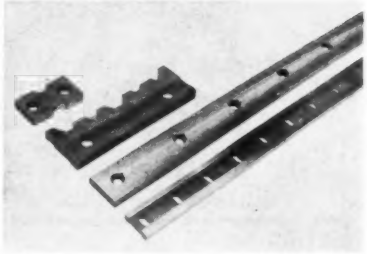
New Spindle Assemblies

All new models of the 4- and 5-position turret drilling heads have new precision spindle assemblies as standard equipment. Each spindle is mounted on two pre-



loaded ball bearings featuring zero clearances for greater rigidity, accuracy, and longer life. For details, write Chicago Quadrill Co., 1846 Busse Highway, Des Plaines, Ill., or Circle Inform-A-Gram No. P2.

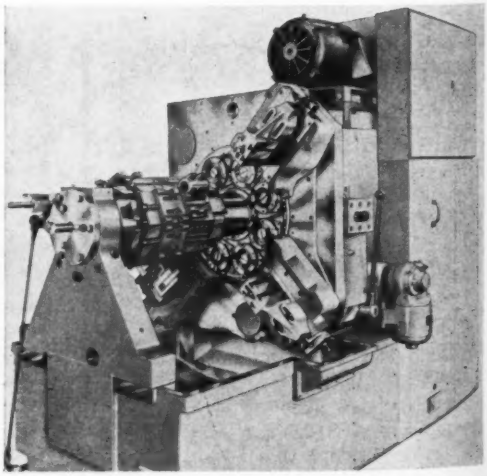
Shear Blades



Solid steel and laid shear blades are available in a complete range of standard and custom designs and in any size or shape up to 180" long. Each blade is made to assure low cost, accurate, and continuous performance in every shearing application. For details, write Simonds Worden White Co., 1101 Negley Pl., Dayton 7, Ohio, or Circle Inform-A-Gram No. P5.

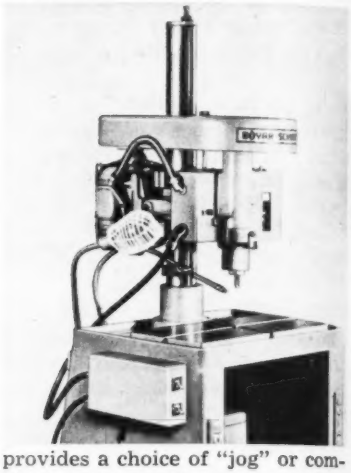
Chucking Machine

A universal cross-slide, two longitudinal feeds, three individual spindle speeds, and the ability to stop and position the spindles are new features of Model 79H 8- spindle chucking machine. Spindle speeds can be selected from 150 to 1750 rpm range. Get data from Baird Machine Co., 1700 Stratford Ave., Stratford, Conn., or Circle Inform-A-Gram No.P3.



New Tapping Control

A new control circuit on Boyar-Schultz lead screw tapping machines provides full control of the tapping motion at all times. It also



provides a choice of "jog" or complete cycle stroke with conventional foot switch control. For data write, Boyar-Schultz Corp., 2000 S. 25th Ave., Broadview, Ill., or Circle Inform-A-Gram No. P4.

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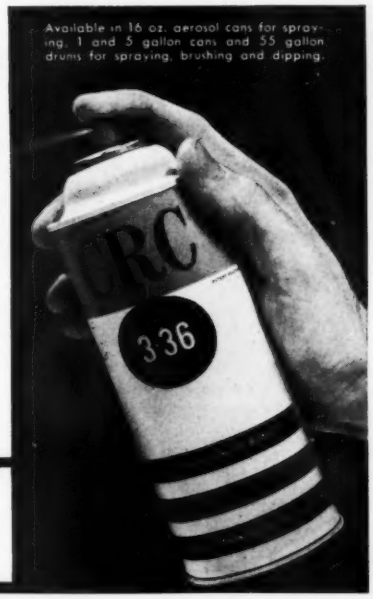
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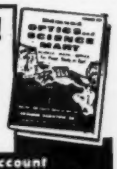

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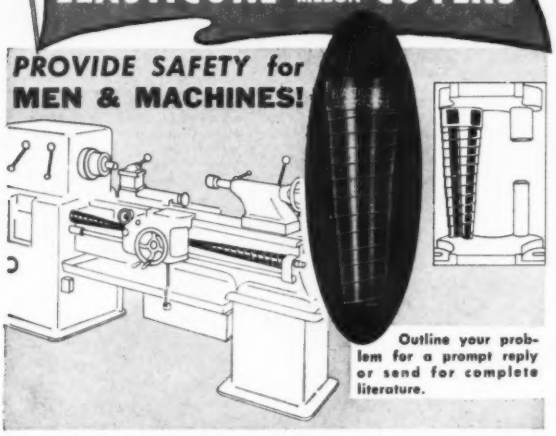

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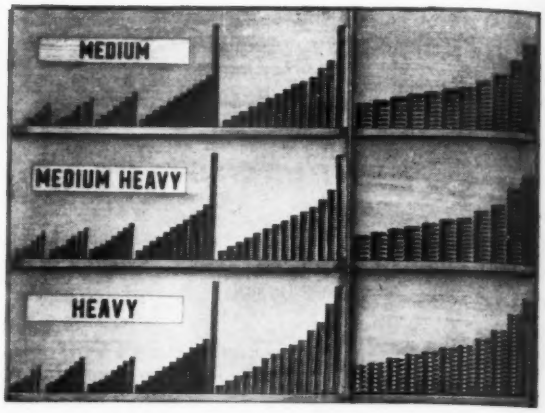

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Manual of Machinability and Tool Evaluation

by ANTONI NIEDZWIEDZKI
Machining Consultant

TYPICAL CHAPTER COVERAGE: Tool Life Formulas . . . Tool Life Criterion . . . Chip Load and Workpiece Hardness . . . Tool Geometry . . . Test Records . . . Tool Inspection . . . Machinability Classification . . . Machine Tool Selection.

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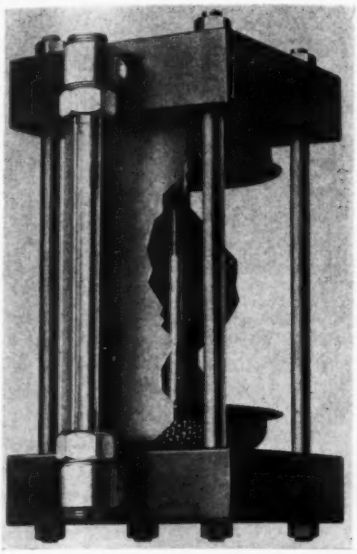
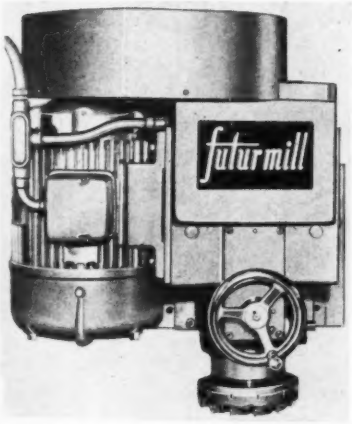
Product News

New Air-Oil Tank Design



To eliminate fog often surrounding air exhausts of air-oil tanks used in booster-equipped cylinders or machines, a new Power-Flo Baffle has been incorporated into the new air-oil tank design. Write The S-P Mfg. Corp., 30201 Aurora Rd., Cleveland 39, for details, or Circle Inform-A-Gram No. P6.

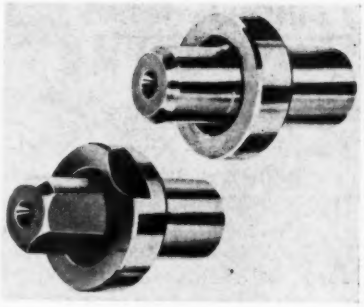
New Milling Spindle



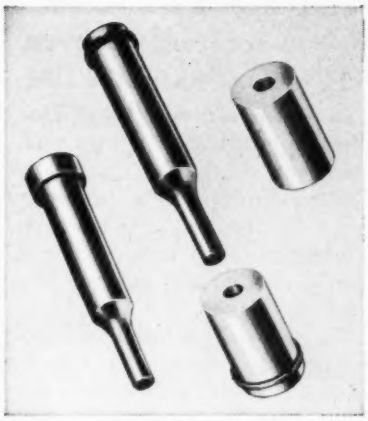
For converting planers and other existing machines to fast, economical carbide milling, use the new lightweight, adjustable-speed milling spindle. Model AS has a range from 125 to 1100 rpm and spindles range from 10 to 25 hp. For details, write Futurmill, Inc., Pontiac, Mich., or Circle Inform-A-Gram No. P7.

Locating Pins

A line of locating pins in two styles in a full range of sizes has been announced by the Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, Ohio. The new pins, manufactured in both diamond and round styles, are designed with a resting shoulder feature that permits the pins to serve as rest pads. Get details from Jergens, or Circle Inform-A-Gram No. P8.



Dies cost less to build, less to buy when you specify RING Punches and Dies



Check your in-shop estimates. Then check Ring prices. Figure the extra savings in reduced die assembly time ...and you will see how you can economize with Ring, yet retain quality.

RING or SOLID HEAD type punches in stock...round, oblong, square, rectangular, slug ejector, pilot, blank. *All punch points ground to specified decimal sizes at no extra charge.* Ring or press fit type dies from stock with hole sizes to proper clearance for the material to be punched. SPECIALS in choice of steels, to your specifications.

WRITE Dept. A for New Catalog of headed and Ring punches and dies, ejector punches, shoulder and bevel quills, and stripper guide bushings.

RING PUNCH & DIE DIVISION
OF THE PRODUCTO MACHINE COMPANY
JAMESTOWN, NEW YORK

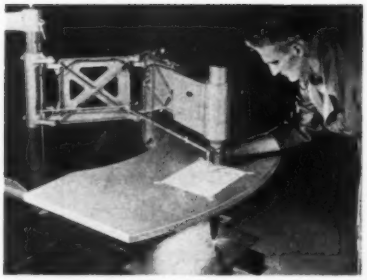
PRODUCTO

CIRCLE INFORM-A-GRAM KEY NO. 135

Product News

Flame Cutter

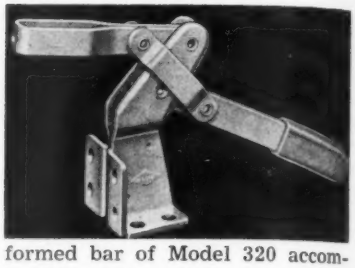
The Gloor Expeditor, a new flame cutter, is designed to meet the need for a fast, accurate, highly versatile production tool for design, development, and prototype work, limited production runs, and making duplicate parts for field repair and maintenance work. Duplication can be made directly from a sketch or drawing



by a manually-controlled tracing pencil. Write Earth Equipment Corp., 1409 Santa Fe Ave., Los Angeles 21, Calif. Circle No. P9.

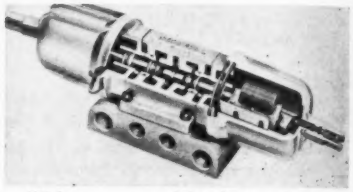
Flipper-Type Clamp

Useful where maximum clearance for removal of the work is required is a new base-mounted flipper - type clamp. The "U"



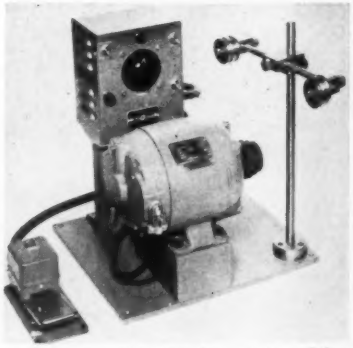
formed bar of Model 320 accommodates a 5/16" spindle. For details, write Wespo Div'n, Vlier Engineering Corp., 26935 W. Seven Mile Rd., Detroit 19, or Circle Inform-A-Gram No. P10.

4-Way Air Valve

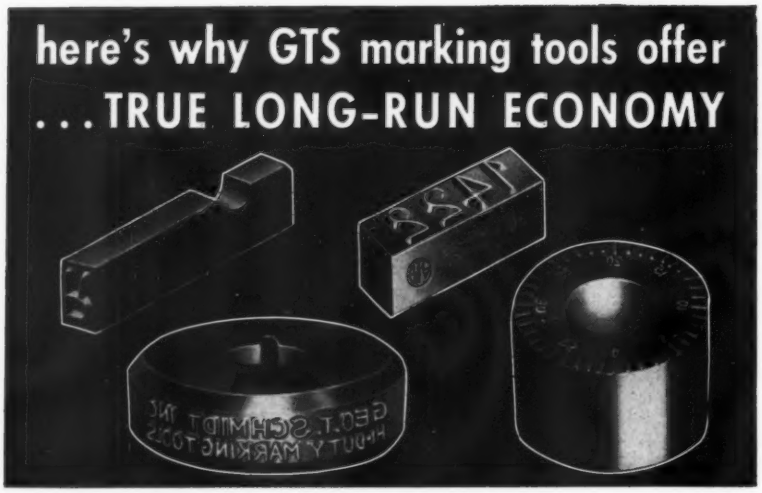


This new positioning valve can inch an air-actuated device to any desired position and hold. Solenoid-operated, the 3/8" valve is available in closed-center or open-center design. Write Mechanical Air Controls, Inc., 10030 Capital Ave., Detroit 37, for details, or Circle Inform-A-Gram No. P11.

Motor Drive Unit



A new electronic motor drive unit contains no tubes and the motor can be stopped or reversed at any speed from 0 to 4000 rpm. Dynamic braking is a standard feature. A 1/8 hp and a 1/3 hp model are available from F. W. Derbyshire, Inc., 157 High St., Waltham 54, Mass, or Circle Inform-A-Gram No. P12.



Engraving Zone precision—performance proved steel—wide experience, ASSURES LONG TOOL LIFE

In the critical Engraving Zone, the faces and bevels of engraved characters must be cut with precision on selected tool steel . . . for tool performance stamina and sharp impressions.

Since GTS Marking Tools are precision cut from the proper steel, your markings are *clear*, *always uniform* and *easy-to-read*. GTS Marking Tools have proved their performance stamina. Years of wide experience, careful inspection and traditional craftsmanship assures you *long tool life* . . . and this means *true long-run economy*.

All GTS marking tools are of the *same high quality*, whether standard or special. *Fast*, dependable delivery, everywhere.

Our Marking Engineers can help you specify the right tools for maximum economy and efficiency. WRITE, WE'LL SEND COMPLETE CATALOG. If you prefer, call EAstgate 7-0300.

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IF IT'S WORTH MAKING, IT'S WORTH MARKING

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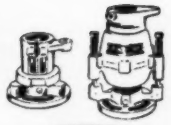
LET'S PUT OUR MULTIPLE HEADS TOGETHER!

. . . and plan your small hole drilling & tapping operation on a low cost, maximum production basis

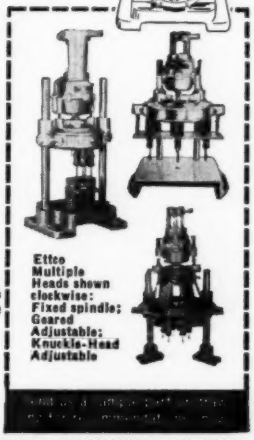


ETTCO-EMRICK
MULTIPLE SPINDLE HEADS

UNIT-ENGINEERED *for drilling or tapping on any drill press*

No one type will do for every job. That's why we make 'em all—and the correct custom tooling for faster handling of the parts. The Ettco system is a completely integrated service; not just multiple heads with spindles reaching into the air!

Ettco engineers can tell you without obligation which type best suits your specific job. They're all easily attachable to your present drill press, tapping machine or automated special. Standardized, reuseable components mean lowered costs. Interchangeable face plates permit quick switch from tapping to drilling. Write for catalog.



Ettco Multiple Heads shown clockwise: Fixed spindle; Geared Adjustable; Knuckle-Head Adjustable

Ettco-Emrick

The only complete line manufacturer of drilling & tapping equipment for the entire small hole field

See your authorized Ettco distributor

ETTCO TOOL & MACHINE CO., INC.
584 JOHNSON AVE., BROOKLYN 37, N.Y.

SEE US IN BOOTH 247, PRODUCTION ENGINEERS' SHOW

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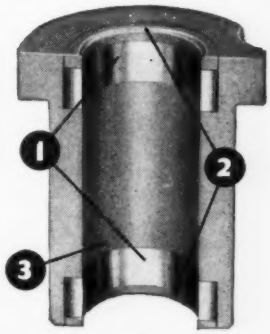
CARBIDE INSERTED MEYCO BUSHINGS Can Cut Production Costs!

MEYCO carbide inserted drill jig bushings have been successfully saving money on production runs for the past decade. Performance: same as solid carbide, but need not be handled with kid gloves. Greater economy, because of long life at less cost. You can enjoy the advantages of greater accuracy for a longer time, less spoilage, less machine down-time, added drill and jig life with MEYCO carbide inserted drill jig bushings. Get the full story now: write for new Bushing Catalog No. 41.



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1. Tungsten carbide rings at the points of wear; **2.** Steel rings protect drills and carbide; **3.** Special hardened alloy steel body.

MEYCO **W. F. MEYERS CO., Inc.**
BEDFORD, INDIANA
A famous name in precision tools since 1888

CIRCLE INFORM-A-GRAM KEY NO. 1373

The ONE answer to hardened steel drilling problems

FORD

HI-ROC CARBIDE DRILLS

Give these FORD "HI-ROC" drills a trial run in your shop. See how many *more* accurate holes you will drill before regrinding is necessary . . . even in metals to 65 R.C. and 280,000 PSI tensile. Choose from 50 standard sizes in lengths from 1½" to 7" . . . or have FORD engineers design and produce "HI-ROC" drills, ground from solid carbide, to your specific requirements.

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Rotary FORD Tools

M. A. FORD MFG. CO., INC. Dept. TP-960
1545 Rockingham Road, Davenport, Iowa
Manufacturers of Precision Cutting Tools

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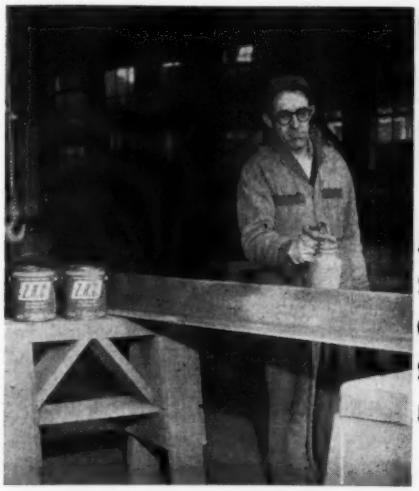
GALVANIZE with Z. R. C.®



to stop RUST!

Any surface— of any size anywhere

Easy to apply by brush, spray or dip!

Z.R.C. is used right from the container, requires no special surface preparation or mixing. Touch dry in 30 minutes, forms a tough, flexible, firmly adherent coating of 95% zinc. THIS COATING WILL WITHSTAND OVER 3000 HOURS OF SALT SPRAY TESTING AND PASSES THE PREECE TEST. It may be top coated if decorative painting is necessary. Cost, about 2¢ per sq. ft.

Production—Z.R.C. galvanizing eliminates handling and shipping costs, speeds operations. Maintenance—Z.R.C. sharply reduces annual labor costs. For full details . . . .

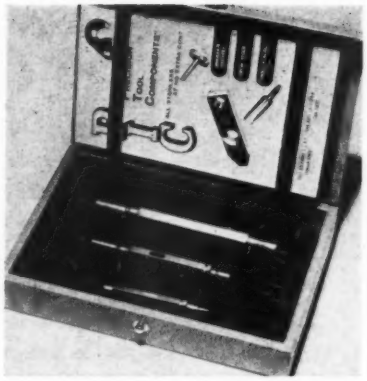
the SEALUBE company, Wakefield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1374

Product News

Tool Plug Gage Set

A wide variety of sizes and combinations of precision hardened and ground plug gages are now available from stock. They come in a felt lined case to protect the critical gage ends. Specifications are listed in a 416 page Master Catalog 21 from PIC Design Corp., 477 Atlantic Ave., E. Rockaway, L.I., N.Y., or Circle No. P13.



deep holes... perfect holes... with S&E solid carbide Bushings*

THE BORE
Super precision ground and lapped to a *jewel finish*— concentric —to exact tolerance.

THE BUSHING
Rigid—Solid Carbide support for *tool-control* and *long tool life.*

THE BODY
Solid Carbide bearing the full length of the bore for *long run bushing accuracy*.

S&E Bushings Cost Less With long accurate bushing life (in excess of 50 times that of steel bushings), they *cut down-time* to the minimum and *boost production* to the maximum. The result is lower bushing costs, reduced inspection time, less scrap and lower tool inventory.

S&E Bushings Perform Best Extremely accurate work can be obtained with the use of these bushings, particularly where precise size and hole location are of paramount importance, or where rigid support and alignment must be maintained. *For gun drilling*, they are considered *a must* . . . they hold the bore size longer . . . they make the tool work better.

* Standard S&E bushings meet all A.S.A. standards. They are also available in all classes of (A.G.D.) gagemakers tolerances. Special and unusual type carbide bushings are regularly fabricated by S&E.

Complete catalog of S&E products available on request.

S&E MACHINE PRODUCTS INC.
Bridgeport, Michigan

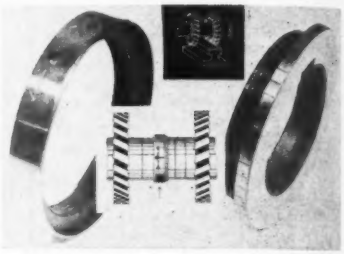
Sales offices in all principal cities.

Tapping and Threading Tools

Eliminate lead screws or sensitive hydraulic and mechanical feeds on automatic screw machines, multiple spindle drilling machines, and turret lathes by

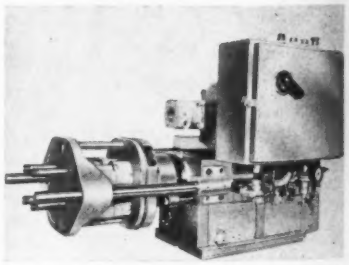
using these tapping and threading tools. They have wide capacity ranges and relatively small diameters. Get details from Tapmatic Corp., 845 E. 16th St., Costa Mesa, Calif., or Circle Inform-A-Gram No. P14.

Micrometer Adjustable Collars



These micrometer adjustable collars eliminate the use of milling machine cutter arbor shims, and make it possible for the operator to obtain adjustment rapidly and accurately. One-quarter thousandths graduations can be easily obtained. They're made in sizes from ⅝" to 3" cutter arbor. For details, write Dayton Rogers Mfg. Co., Minneapolis 7, or Circle Inform-A-Gram No. P15.

New Tapping Unit



A lead screw tapper permits changing tapping pitch without changing lead screw nut or spindle. A coarse pitch ground Acme thread lead screw and nut reduces wear and provides long life. Tapping pitch is changed by changing only one gear. Write Thriftmaster Products Corp., 1048 N. Plum St., Lancaster, Pa., for literature, or Circle No. P16.

LASSY TAPPERS . . .

Lassy Tappers make tapping easy, fast and simple. Exclusive patented features eliminate guess work, drastically reduce labor costs, save taps.

3 SIZES.

FREE ILLUSTRATED CATALOG AND PRICES.

UNCONDITIONALLY GUARANTEED

LASSY TOOL CO.
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BARREL FINISHING MEDIA

No jamming or "rolling over." Special shapes prevent jamming and rapid deburring saves costs.

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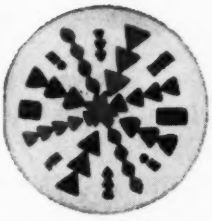

FORTUNE INDUSTRIES, INC.
11770 Dexter Road, Chelsea, Mich., Phone GR 9-3621

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TOOLING BALLS

- Durable; corrosion-resistant. Made of Type 440-C stainless steel, hardened to 55-58 Rockwell C.
- Highly accurate. Ball size held to ±.0001" for fixture balls; ±.00002" for checking balls.
- In stock: Types 224 and 448 in 7 ball sizes, ¼" to 1" by ⅛" steps; Type 348, with ½" ball and shouldered shank tapped 6-32. Other sizes to order.

WRITE FOR price list and ASTE Data Sheet

INDUSTRIAL TECTONICS, Inc.
MANUFACTURERS OF PRECISION BALLS AND BEARINGS
3600 JACKSON ROAD
ANN ARBOR 4, MICH.

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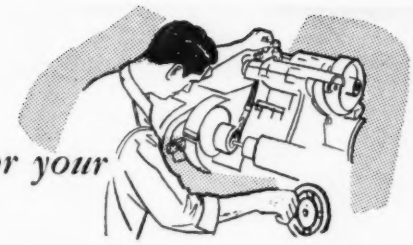

For your

High-precision Machines

here's a unique internal gage to

MONITOR THEIR PRODUCTION

Visit automotive transmission plants and you'll find Comtorplugs all along the line . . . used to gage hundreds of internal dimensions with tolerances in close tenths. That's just one example of where Comtorplug puts laboratory precision in the hands of shop people. This is made practical by Comtorplug's unique combination of: Moderate Cost . . . Ruggedness . . . Automatic Accuracy.

Easily readable to 50 millionths
In large .0001" graduations, the pointer provides a FIXED (not passing) size reading.

Uniform accuracy automatically assured
Unique self-aligning, self-centering and uniform gaging pressure guarantee duplication of results free of user influence.

Positive 2-point contact
Reveals front or back tapers, ovality, barrel shape, bell mouth, showing actual amount of deviation.

COMTORPLUG USERS INCLUDE:

Airesearch Mfg. Co.	Douglas Aircraft	Lear, Inc.
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Request Bulletin 50

COMTOR CO., 82 FARWELL ST., WALTHAM 54, MASS.

COMTORPLUG
with interchangeable expanding plugs to gage simple or special bores from 1/8" to 10" dia.

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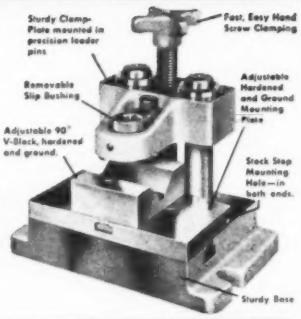
REPCO Time-Saving Tools

ADJUSTABLE V-BLOCK DRILL JIG

Saves Set-Up Time— Increases Output

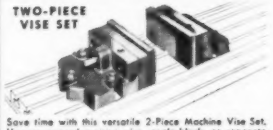
Here is a versatile and accurate V-Block that makes center and off-center drilling, tapping, and reaming easy and precise. Four-way V-block adjustment simplifies handling a wide range of work. Fast, easy positioning and clamping speed production. A centering locator plug and T-slots in the mounting surface plates assure fast, easy, on-center adjustment. Drill capacity #80 to ⅝" diameter. Handles stock from ¼" to 2" diameter.


Sturdy Clamp-Plate mounted in precision leader pins
Fast, Easy Hand Screw Clamping
Removable Slip Bushing
Adjustable Hardened and Ground Mounting Plate
Adjustable 90° V-Block, hardened and ground.
Stock Stop Mounting Hole—in both ends.
Sturdy Base

TRUE-CENTER ADJUSTABLE TOOL HOLDER

The REPCO Adjustable Holder is a precision-built tool, having two-piece construction which provides fast adjustment of the main body to compensate for as much as ⅛" machine misalignment. Cuts down on tool wear, breakage, and scrap.

TWO-PIECE VISE SET

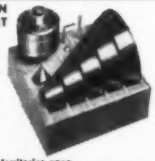


Save time with this versatile 2-Piece Machine Vise Set. Use as general-purpose vise, angle-block, or separate clamping device. Opening limited only to length of machine base. Light, accurate, rigid. Two sizes: 6" and 8".

CHUCK JAW TRUING-RING SET

This Ring Set saves time, cuts cost of boring jaws. With correct diameter rings at hand, you gain hours of productive time. Plated rings range from 1" to 4" by ⅛" increments. Handy peg-type rack keeps rings in place.

COMBINATION LIVE-CENTER SET



Heavy-duty live center plus six interchangeable adapters, ranging from a point to 6⅛" dia. bell. Saves costly set-up and machining time necessary to make large-diameter centers. Straight and various taper shanks available.

Write for complete information—Exclusive agent territories open.

REPCO ROCKFORD ENGINEERED PRODUCTS CO.
2322 —23rd Avenue • Rockford, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1401

ELIMINATE WEAR ON YOUR COSTLY DIE SETS

WITH INEXPENSIVE
ACRO
LEADER PIN OILERS

Pin oilers in place on die set.

These simple, inexpensive pin oilers fit over each leader pin and seal in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and upward stroke distributes oil evenly over leader pins. You'll eliminate bushing wear, leader pin scoring, and maintain die accuracy with these oilers.

Order today. Prices shown are F.O.B. Milwaukee.

Pin dia. ⅞", 1" or 1¼"	Pr.	$ 6.50
Pin dia. 1¼", 1½" or 1¾"	Pr.	8.00
Pin dia. 2"	Pr.	10.00
Pin dia. 2½"	Pr.	12.00
Pin dia. 3"	Pr.	14.00

FREE FACTS covering four more money saving accessories for your plant are included in this new folder. Write today. Ask for bulletin TP59.

ACRO METAL STAMPING COMPANY
3387 E. Reservoir Ave., Milwaukee, Wis.

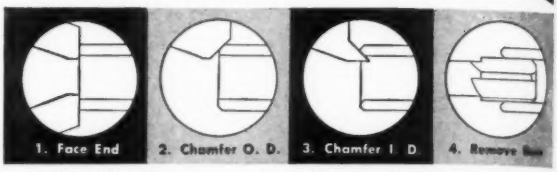
CIRCLE INFORM-A-GRAM KEY NO. 1402

TUBE DEBURRING TOOL DOES 4 JOBS AT ONCE

ROUGH END . . .

BRASS • COPPER
STEEL • ALUMINUM

. . . TO FINISHED END



- Replaceable cutters
- Replaceable pilot reamers
- Adjustable for size control
- Easily reground in your plant

Standard sizes for 3/16" to 1-1/4" tubing.

Write for Bulletin 46P

GENESEE MANUFACTURING COMPANY
566 HOLLENBECK ST. • ROCHESTER 21, N. Y.
Adjustable Hollow Mills · Facing and Counterboring Tools · Special Production Tools
Tube Deburring Tools · Since 1908

CIRCLE INFORM-A-GRAM KEY NO. 1403

ROTARY BUSHINGS

For DRILLING, CORE DRILLING, ROUGH and FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work — or both.

Eliminates expensive tool construction — Reduces tool wear — Prevents seizure and pilot breakage — Especially adapted where precision is required.

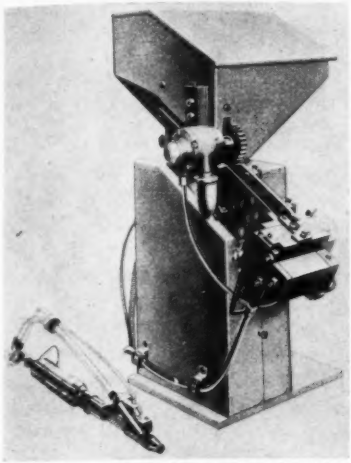
Write for full information and prices

GATCO ROTARY BUSHING CO.
42322 ANN ARBOR RD., PLYMOUTH, MICH.
GLenview 3-2295

CIRCLE INFORM-A-GRAM KEY NO. 1404

Product News

Screw Feeder-Driver



A new automatic screw feeder-driver is adaptable to all standard pneumatic and most electric screw drivers. Model JS-60 is portable and adjustable for use with screws of any diameter from No. 2 through No. 14. For details, write Parker-Kalon, Div'n of General American Transportation Corp., Clifton, N.J., or Circle No. P17.

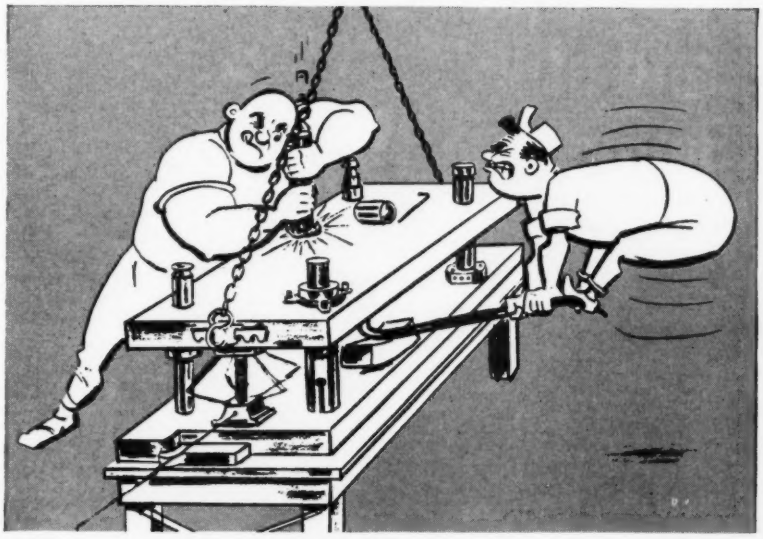
Mist Spraying Units

Controlled mist spraying of coolants and drawing compounds is now easier and more dependable with the new Unimist metering block and tank units. Simplified design of the new block incorporates an external stop for the on-off plunger that prevents accidental jamming. Contact Unimist, Inc., 510 28th St., S.W., Grand Rapids 9, Mich., for details, or Circle No. P18.

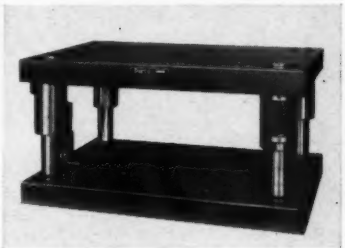
Combination Press

A combination multiple slide and transfer press cuts conventional tooling costs as much as one half and is economical for short run, small parts producers. The Bliss-Derota, available in 3- and 9-ton models, can blank, pierce, form, and bend in a single continuous operation at speeds up to 100 spm. Contact E. W. Bliss Co., Press Div'n, 1375 Raff Rd., S. W., Canton 10, Ohio, or Circle No. P19.

DON'T KNOCK YOURSELF OUT WITH STICKY DIE SETS!



Dieco Ball Bearing Die Sets take all the strain out of die making!



NO PAIN...NO STRAIN...and it is extremely accurate! These precision die sets give you burr-free parts and longer production runs – thanks to their "negative clearance." (Cutaway shows how ball-bearing bushing rides on the pin.)

Try a Dieco ball-bearing die set on that next job; you will actually see the punch holder g-l-i-d-e on and off. Folks tell us working with Dieco is almost like taking a two-week vacation. It's that easy.

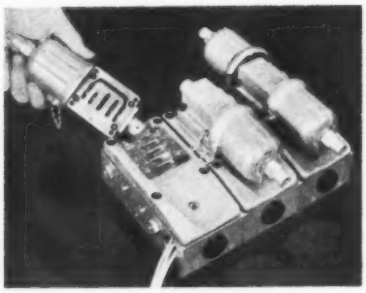
Management likes them, too. The pre-loaded bushing eliminates die shifting, protects the dies, and gives longer runs between grinds. These sets are assembled in the conventional way; pins are in the shoes. We will sell you complete sets, or just the components, so you can convert the friction bushing sets you now have.

dieco DIE SETS

E. W. BLISS COMPANY
DIE SUPPLY DIVISION
1400 Brookpark Road
Cleveland, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 141

Product News



New Air Valves

Solenoid-operated air valves can now be combined quickly and easily to provide a single-compact, and inexpensive manifold to suit the application. Two or ten or more MAC add-a-unit manifold-base 4-way valves may be ganged together to form common inlet, exhaust, and conduit channels. Write Mechanical Air Controls, Inc., Detroit 37, for details, or Circle Inform-A-Gram No. P20.

31,000,000 ft
and still
going...
with Ferro-Tic*
At AVON Tube** Ferro-Tic form rolls produced well over 31,000,000 ft of welded steel tubing on a job where tool steel formrolls ran only 1,000,000 ft

FERRO-TIC (the only machinable carbide in existence) combines the fabricating advantages of steel with the wear-resistance of carbide. In the annealed, completely dense state, **FERRO-TIC** can be machined with high-speed tools on conventional tool room equipment; thus, the need for costly diamond grinding is eliminated. Once hardened, by oil quenching from 1750°F, **FERRO-TIC** is extremely hard and wear-resistant. **FERRO-TIC** stock blanks can be fabricated into long-wearing components, using available tools and skills without delay! **FERRO-TIC** is ideal for: Blanking, Lamination, Deep Drawing and Heading Dies, Arbors, Core Rods, Wear Parts, etc. **FERRO-TIC** can be turned, drilled, milled, sawed, tapped. . . .

AGENTS THROUGHOUT THE U.S.A.
WRITE FOR ILLUSTRATED BULLETIN P-9

Sintercast

Division of **CHROMALLOY CORPORATION**
134 Woodworth Ave. • Yonkers 2, N.Y. • YOnkers 9-6767
CHROMALLOY DIVISION, WEST NYACK, NEW YORK
CHROMIZING CORPORATION, LOS ANGELES, CALIF.
PROPELLEX CHEMICAL DIVISION, EDWARDSVILLE, ILL.
ELYRIA FOUNDRY DIVISION, ELYRIA, OHIO

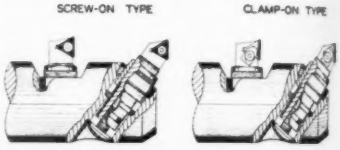
*Reg. U.S. Trade Mark
**AVON Tube Div. HIGBIE Mfg. Co.

CIRCLE INFORM-A-GRAM KEY NO. 142

Square Body Valves

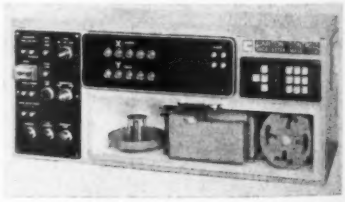
Seven new heavy-duty square body valves, operated manually and mechanically, are used as controls on fine quality machine tools and other applications. They're ¼" size and available in 2- or 3-way normally open or normally closed models. Literature is available from Humphrey Products Div'n, General Gas Light Co., Kalamazoo, Mich., or Circle Inform-A-Gram No. P21.

Calibore Insert Unit



Available in two styles, screw-on and clamp-on types, the adjustable Calibore insert units come in a total of 21 sizes in zero-positive or negative rake angles. The carbide inserts can be indexed three times in Calibore insert units with zero and positive rake angles. For data, write Beaver Tool & Engineering Corp., 500 W. Country Rd., Gaylor, Mich., or Circle Inform-A-Gram No. P22.

Positioning Control



Model 600 numerical positioning control for point-to-point positioning of machine elements has been announced by Carlton Controls Corp., 15 Sagamore Rd., Worcester 5, Mass. Absolute decimal digital control employs no binary or analog circuitry, resulting in a simpler system. For details, write the company, or Circle Inform-A-Gram No. P23.

Revolutionary New Way To Check Screw Thread Pitch Diameter Without Calculations Or Tables!

NEW O-VEE SCREW THREAD MEASURING GAGES & COMPARATORS

ONLY 3 EASY STEPS NEEDED WITH THE O-VEE THREAD GAGE

1-**INSERT**—Expand coils by depressing—insert screw
2-**MEASURE**—Take measurement over coils
3-**COMPARE**—Check measurement with limits on data plate

O-VEE Gages are available for all std sizes from #5 to 1" — All series — All class fit. Special sizes available from 1/8" up to and including 5"

O-VEE COMPARATOR

Based upon the same principle and using interchangeable coils, this comparator gives a visual reading within any pre-set tolerance range. Available in 3 models.

Model # 2
Range 1/8" to 1-1/4"
8 to 32 T.P.I.

ASK FOR ILLUSTRATED FOLDER

SCHERR-TUMICO

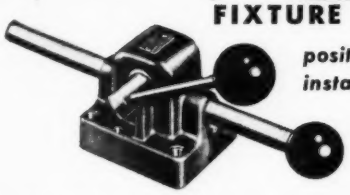
PRECISION MEASURING TOOLS AND INSTRUMENTS

WAREHOUSE STOCK, SHOWROOMS & SALES OFFICES AT
NEW YORK: 200 Lafayette Street, New York 12, N. Y.
ST. JAMES: St. James, Minnesota
LOS ANGELES: 3337 West Olympic Blvd., Los Angeles 19, Cal.
CHICAGO: 5045 W. Harrison, Chicago 44, Ill.
When writing to any of the above locations, refer to DEPT. E-9

CIRCLE INFORM-A-GRAM KEY NO. 1431

heinrich *Grip-Master*

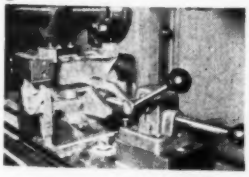
FIXTURE LOCKS

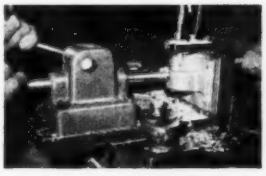


positive clamping
instant setting

SIMPLIFY JIG AND FIXTURE DESIGN

LONG TRAVEL provides plenty of chip clearance, easy loading and unloading. Gets into hard-to-reach places. Base sizes: Model 2FL, 3⅜" x 3¼"; Model 9FL, 4⅜" x 3⅝". Bar lengths from 8" to 18". Here are two examples of Grip-Masters speeding production in drilling and milling operations.

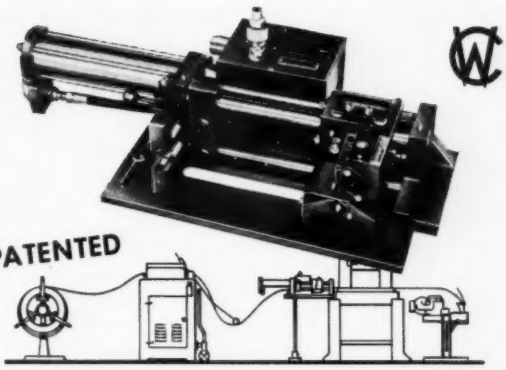




See Your Industrial Distributor or Send for Big, Free Catalog on Heinrich Tools

HEINRICH TOOLS INC., DEPT. 130-I
RACINE, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1432



PATENTED

air operated slide feeds

The proven, low-cost way to get increased output and efficiency from your present stamping and shearing equipment. Ideal automatic operation even on short runs and frequent changeovers.

Simple, versatile, self-contained — operates from standard air lines — install directly on press bolster — simple air valve and cam timing — quick, accurate single-screw feed adjustment — open throat construction handles widest range of stock widths — nine sizes, with strokes to 24", for flat or irregular stock to 3/16" thick and 30" wide in lighter gauges.

FOR A FULLY AUTOMATIC STAMPING LINE
also ask about Cooper Weymouth combination cradles and straighteners, stock reels, stock and wire straighteners, scrap choppers and small parts straighteners.

COOPER WEYMOUTH, INC.
603 Honeyspot Road, Stratford, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 1433

Even **holes** cost less in quantities... when you use

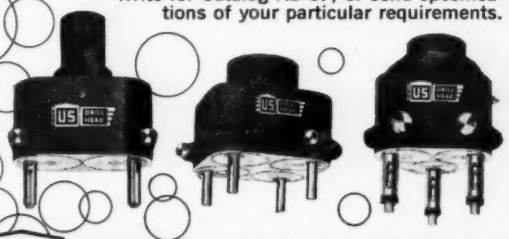
U.S. DRILL HEADS!

That's because these Standard Adjustable U.S. Heads are designed and built for profit-making performance . . .

Positive, all-gear drive . . . Shaved gears for smooth, quiet operation . . . High factor of safety in design . . . Anti-friction bearing mounting of shafts and spindles.

Ideally suited for high production with flexibility . . . drilling or tapping.

Write for Catalog AD-57, or send specifications of your particular requirements.

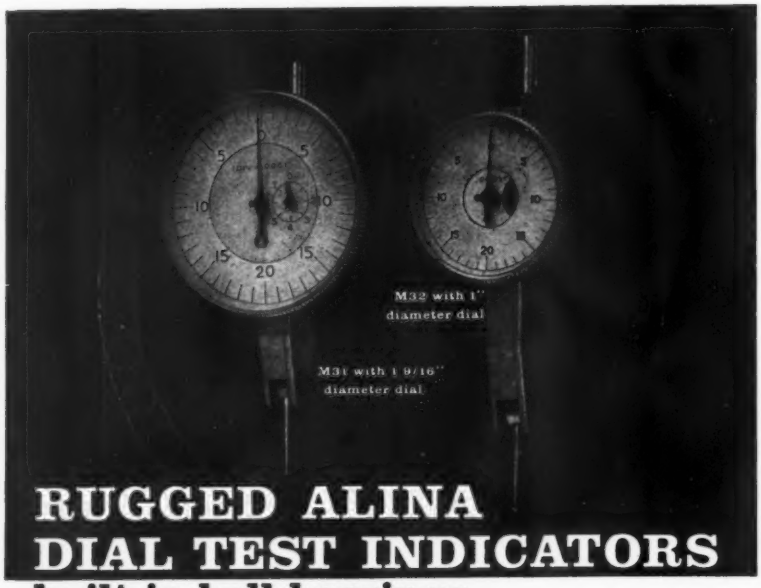


US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads. Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.
BURNS STREET • CINCINNATI 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1434



RUGGED ALINA DIAL TEST INDICATORS

built-in ball bearings

for greater sensitivity—reduced pressure—improved accuracy

- Jeweled • Shock Proof • Range .032" • Graduated .0001"
- Reading 0-20-0 • Fully reversible contact point

Available with a wide variety of rectangular or round shanks.

The instruments shown here are part of a complete line of precision DIAL TEST INDICATORS of all types — Write for brochure!

ALINA CORPORATION

122 East Second St., Mineola, L.I., N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1441

Eliminate Sharpening and Blade Adjusting

with Wetmore Indexable Insert Milling Cutters

Simply unclamp and index the carbide inserts to renew the cutting edges—eight sharp edges per insert. Two-piece body construction permits precision grinding of insert seats during manufacture and insures perfect alignment of inserts after indexing.

Inexpensive replacement cost of indexable carbide inserts and their much greater convenience in milling operations lead to unprecedented economies. Wetmore designs utilize precision ground insert blanks that are standard with leading manufacturers and are readily available from local suppliers' stocks.

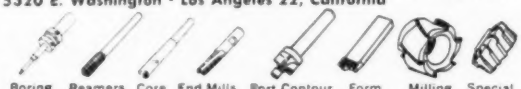
Wetmore Indexable Insert Milling Cutters are available in a wide range of standard types and sizes. Write for completely descriptive Catalog No. 06-D.

Wetmore Tool & Engineering Co.

5320 E. Washington • Los Angeles 22, California

Phone: ANgelus 9-7266 TWX: LA 2085

Wetmore Tools



Boring Tools | Reamers | Core Drills | End Mills Routers | Port Contour Cutters | Form Cutters | Milling Cutters | Special Cutters

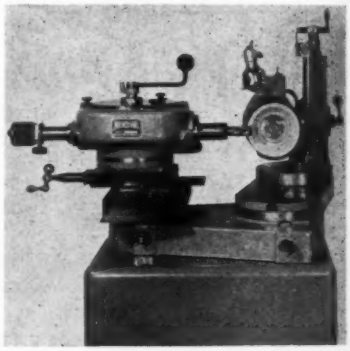
CIRCLE INFORM-A-GRAM KEY NO. 1442

Product News

New Band Saw Dispenser

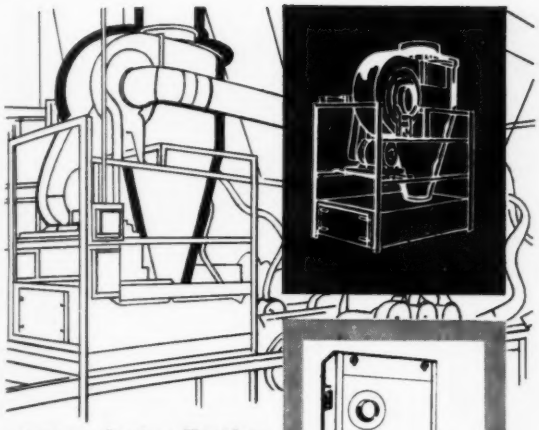
Coilguard band saw dispenser is made of high impact plastic for smooth easy dispensing and recoiling and to provide complete band saw protection. Special nesting pins allow shoulder to shoulder stocking and the hex shape prevents rolling. Get details from The Capewell Mfg. Co., Hartford, Conn., or Circle Inform-A-Gram No. P24.

Universal Grinder

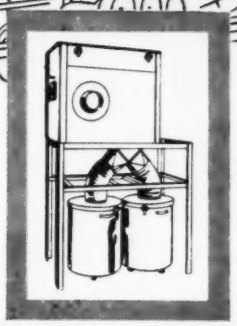


This floor model multi-spiral grinder quickly and easily grinds cutting tools such as standard end mills, spiral end mills, taps, reamers, and counterbores. It can also make end mills, step drills, and other end cutting tools from the solid. Write for information to Spiral Step Tool Co., 5400 N. Damen Ave., Chicago 25, or Circle No. P25.

PROTECT YOUR FUTURE
BUY
U. S. SAVINGS BONDS
TODAY!



Custom dust collection
—with a standard unit . . .



Regardless of your dust collection problem, chances are there is a space-saving Dustkop model to fit the job. Aget, for years, has led the field in efficient, compact design and has developed more than 50 standard Dustkop collectors. Each is job-tailored to most grinding, buffing or finishing operations—as well as many other types of service. Write for illustrated brochure that helps select your tailored Dustkop unit.

Also a complete line of mist collectors

C.S.A. APPROVED. Write for name of nearest representative in Canada

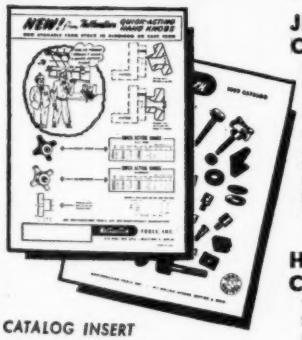
AGET MANUFACTURING COMPANY 1384 EAST CHURCH ST., ADRIAN, MICHIGAN DUSTKOP Stops Dust

CIRCLE INFORM-A-GRAM KEY NO. 1451

NEW

ALUMINUM CAST IRON

QUICK-ACTING HAND KNOBS



CATALOG INSERT
NEW 16 PAGE CATALOG
CATALOG INCLUDES TRACING TEMPLATES

FREE! **WRITE TODAY**

JIG AND FIXTURE COMPONENTS
LATCH BOLTS
CAST IRON HAND KNOBS
ALUMINUM HAND KNOBS
QUARTER TURN SCREWS
SHOULDER SCREWS
JIG FEET (3 TYPES)
SPHERICAL WASHERS
FIXTURE KEYS
KNURLED HEAD SCREWS
TOGGLE SHOE CLAMPS & V-PADS

HOLD DOWN AND CLAMPING TOOLS
T-NUT & STUD SETS
STEP BLOCK & CLAMP SETS
FLANGED NUTS
CUT THREAD STUDS
TEE NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
STRAP CLAMPS (PLAIN & STEP TYPE)

NORTH WESTERN *Northwestern* NORTH WESTERN
116 HOLLIER AVE., DAYTON 3, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1452

WORLD'S LARGEST SELECTION OF

DECIMAL REAMERS and COUNTERBORES

WHY BUY SPECIALS
WE STOCK Thousands by the THOUSANDTHS!

Write for REVISED Catalog

TWENTIETH CENTURY MFG. CO.
Box 429 TP Libertyville, Illinois
In emergency Telephone Libertyville 2-4200

CIRCLE INFORM-A-GRAM KEY NO. 1453

NEW! for tool and die makers . . . . . Scribe-IT

MARSHALL'S TIME SAVING COMBINATION
in the most popular sizes of:
OIL-cut GROUND FLAT STOCK

Cost Saving!

18" and 36" lengths

Ready for scribing and layout.
Method of pre-coloring does not change size.
Same price as Standard Flat Stock.
Resists rust.
Permanent identification.
Can be finished to Standard size after heat treatment.
Retains 25 to 35 R.M.S. (Micro finish).
Protected fully and easily distinguished by new Scribe-IT aluminum foil packaging.
Available in practical range of sizes for tool and die making.
Pre-colored and Oversize but retains accuracy of dimensions.

Write for descriptive literature and prices

MARSHALL STEEL COMPANY
Box 108 TP La Grange, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1454

NEW HOLOMATIC DRILL UNITS

with 4" – 6" or 10 INCH STROKE CAPACITY

To meet your ever increasing production tempo, Hause has developed two new drill units with 6" and 10" stroke capacities. As was the original time-proved 4" stroke model, the new Holomatic drill units are completely self-contained reciprocating quill type power devices for use on *production drilling, reaming, centering, facing,* etc. They can be used individually or in groups with manual or full automatic cycling. Units are air actuated, precisely controlled hydraulically. Available with six standard drives, motor horsepowers to 2 H. P., spindles are interchangeable for single or multiple head applications.

- Concentric construction assures accuracy, longer life
- Honed, polished and chromed thrust piston and quill
- Up to 3600 four-inch stroke cycles per hour
- Automatically filled hydraulic system
- Built-in hydraulic oil filter system
- Sealed—oversize ball bearings on spindle and shaft
- Sealed unit construction permits mounting in any position
- Mounting surfaces on three sides for installation flexibility

Find out now—why Holomatic drill units are setting the pace in progressive production plants across the nation. Your Hause representative will gladly demonstrate their multiple dollar-saving efficiencies right in your plant.

Write today *... for demonstration or additional information, specifications and prices on the new Holomatic "Air-Hydraulic" Drill units, "Balanced Air" Threading units, "Lead Screw" Tapping units, complete machines or full line of machine bases and accessories.*

Hause

MACHINES, INC.
MONTPELIER, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1461

Self Centering BORE GAGE

WITH SUPER SENSITIVE GAGING HEAD made by Mahr

Will Repeat within 50 millionths of an inch

THIS PRECISION INSTRUMENT IS AN INEXPENSIVE, ACCURATE AND DEPENDABLE
INTERNAL COMPARATOR
READING DIRECTLY IN 50 MILLIONTHS OF AN INCH

SMALL BORE GAGES — With interchangeable, springloaded Split Jaw Measuring Heads

Range .059" to .160"	$88.50
" .160" to .280"	72.50
" .280" to .400"	72.50

LARGER SIZES — Employing a springloaded bridge, as illustrated

Range .400" to .700"	$72.50
" .700" to 1.400"	67.50
" 1.400" to 2.400"	67.50

Complete in Hardwood case, without gaging head. Extra for gaging head reading in .000050" ... $37.50 which may be interchanged in the various sets. Other heads reading in 20 millionths or .0005" available.

OTHER SIZES BORE GAGES — Up to 32" in diameter and 88" hole depth

The most COMPLETE Line of BORE GAGES

- PRECISION COMPARATOR STAND for checking of mass-produced small parts
- RIGHT-ANGLE BORE GAGES for hard-to-measure places.
- Tungsten carbide tipping of extensions and contact points.
- Extensions for deep bores up to 88"

GUARANTEED (Mahr) QUALITY
AT YOUR FAVORITE SUPPLY-HOUSE OR WRITE TO

MAHR GAGE CO.
274-TO LAFAYETTE STREET • NEW YORK 12, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1462

THE MOST USEFUL TOOL IN YOUR SHOP

Economy Elevating Table

- **DIE HANDLER**
- **LOAD LEVELER**
- **CONSTANT HEIGHT TABLE**
- **PORTABLE WORK TABLE**

Dimensions.....24" x 36"
Capacity.....2000 lbs.
Lift.....24" min. to 42" max.
Price: F.O.B. Chicago $245.00

Free 10 day trial in your plant with return privilege

POSITIVE PERFORMANCE
Self-locking Acme screws hold load safely, securely, at any height.

COMPACT DESIGN
No projecting parts—all four sides accessible; crank studs at both ends; three table surfaces.

ECONOMY ENGINEERING 4509 W. Lake St., Chicago 24, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1463

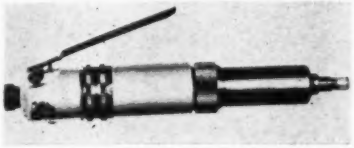
Product News

Inspection Tools

A single kit contains a complete set of industrial optical tools. Over 20 optical units can be assembled into a variety of optical viewers, surface comparators, and microscopes which are especially valuable for quality control and inspection work. Write Bausch & Lomb Incorporated, Rochester 2, N.Y., for details, or Circle Inform-A-Gram No. P26.

Torque Limiter

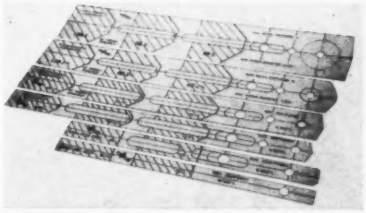
For torque accuracy, use the torque limiter with pre-set fastener control that releases instantly when the predetermined torque is reached. It has a torque range



from 2 in-lbs to 85 in-lbs, and is interchangeable with both lever and pistol grip models. Contact Master Power Corp., Bedford, Ohio, for information, or Circle No. P27.

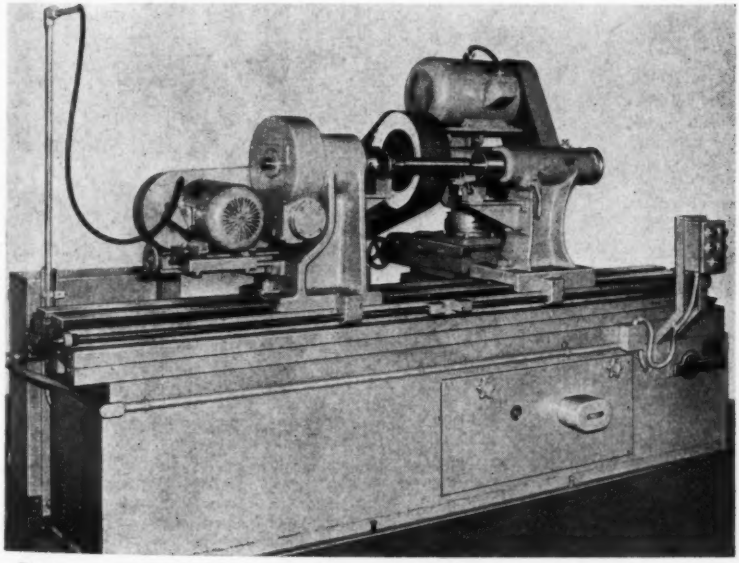
Layout Templets

Simplify and reduce layout time in making mounting template drawings to locate pilot pins, mounting holes, and position of hole punching units by using Uni-



punch transparent layout templets. Write Punch Products Corp., 370 Babcock St., Buffalo 6, for Catalog M, or Circle No. P28.

Polishing-Buffing Machine



Shafts and rolls of various diameters and lengths can be finished with the new Acme automatic polishing and buffing machine. Rolls and shafts up to 32" and 72" long and can be polished to a 2 micro-inch surface finish. Get details from Acme Mfg. Co., 1400 E. 9-Mile Rd., Detroit 20, or Circle Inform-A-Gram No. P29.

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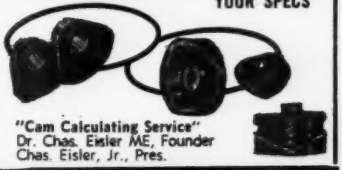

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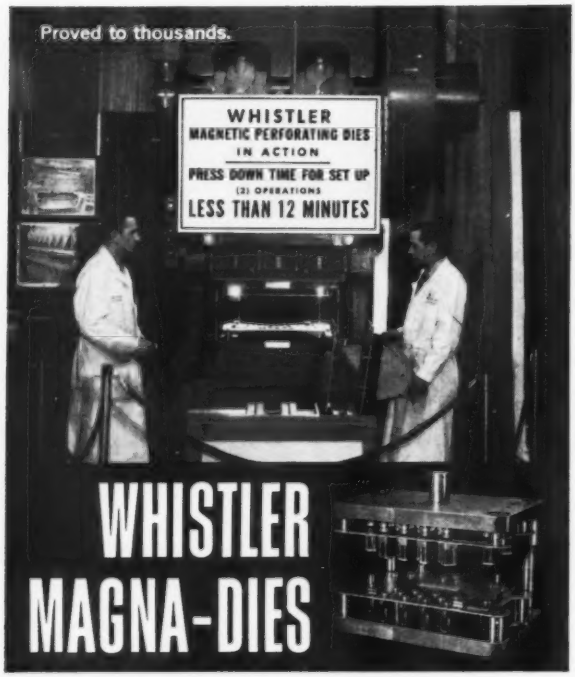
EISLER ENGINEERING CO., INC.

CIRCLE INFORM-A-GRAM KEY NO. 1475

faster changeovers boost press production



Whistler Magnetic Perforating Dies feature interchangeable parts fastened to steel templates which are patterned to the stamping. Punches and dies are assembled and disassembled in templates on an assembly bench while the presses are working on other production.

- **REDUCE DIE COSTS:** In one plant, over 1500 operations (for parts up to 3' x 5') have been tooled up at an average cost of $200 each.
- **EXTEND PUNCH AND DIE LIFE**
- **SAVE STORAGE SPACE**
- **ELIMINATE DELIVERY DELAYS:** Punches and dies stocked in .001" increments from .100" to .500" diameters. Other sizes in stock up to 3".

GET THE TIME AND MONEY SAVING STORY ON WHISTLER PRODUCTS:
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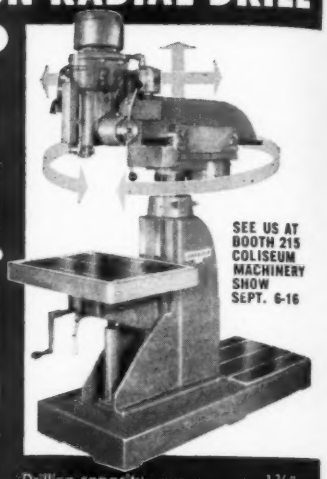
8-speed gear drive. Proper speeds instantly—change while machine is running.

Large or small work pieces handled with ease—drill head swings 360° allowing work to be placed on front table or rear platform.



SEE US AT BOOTH 215 COLISEUM MACHINERY SHOW SEPT. 6-16

Drilling capacity . . . . . 1¾"
Spindle taper . . . . . Morse No. 4
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Spindle to col. (max.) . . . . . 36"
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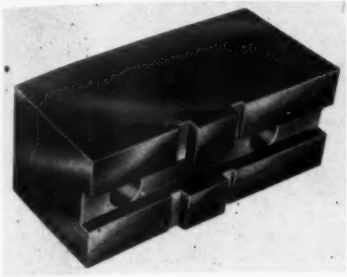
DEPT. TP-9, 712 E. 163rd ST., CLEVELAND 10, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1483

Product News

Soft Blank Top Jaws

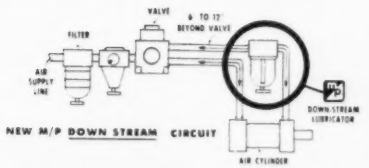


A complete line of soft blank top jaws, in sizes and shapes for all chucks made to American standards, have been announced by The Skinner Chuck Co., Dept. TJ9, New Britain, Conn. Medium- and heavy-duty types in standard, extra-high, and long-pointed jaw construction are included. They're made from low carbon steel which can be easily hardened. Write the company for data, or Circle Inform-A-Gram No. P30.

Lubricant Sample

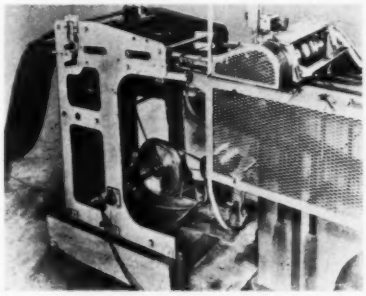
A grease consistency lubricant, Molykote G, eliminates fretting, galling, seizing, and metal pickup in high bearing pressure applications such as heavily loaded gears, cold metal forming, threaded connections, and press fitting. Write The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn., for a sample and Bulletin 126B, or Circle Inform-A-Gram No. P31.

Air Cylinder Lubrication



Master Pneumatic, Inc. has designed a Down-Stream lubricator which mounts between the valve and air cylinder to permit 90% of the dispensed oil to reach the cylinder. For details, write the company at 20428 Sherwood, Detroit 34, or Circle No. P33.

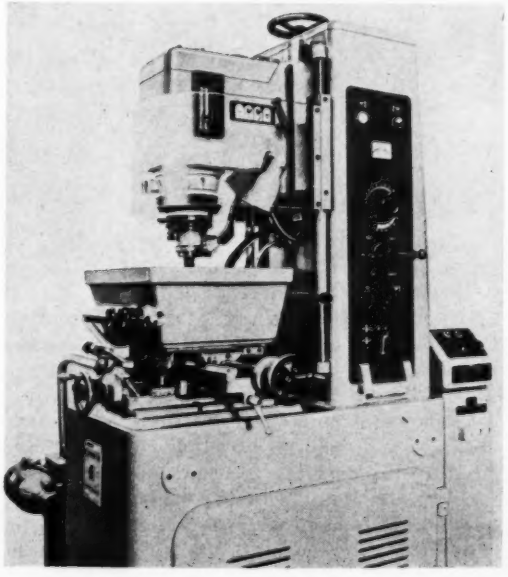
Cut-Off Shear



A portable shear for cutting off metal strip while it is in motion during automatic forming operations, handling 15" wide, 20 ga steel at up to 7,000 ft/hr, has been developed by Crest Engineering Co., 529 S. 7th St., Minneapolis 15. Length tolerance for cut product is 0.100". For details on Model C-571, write the company, or Circle Inform-A-Gram No. P34.

Electric Dischargers

Magnetic electrode holder for working and locating within ±0.0002", hydraulic servo, table with jig borer accuracy, and 10 micro-inch surface finish guaranteed, are features of the new automatic electrical discharge machine. The Eleroda D1 and D15 are available from Charmilles Engineering Works, Ltd., 25-20 43rd Ave., Long Island City 1, N.Y., or Circle Inform-A-Gram No. P32.



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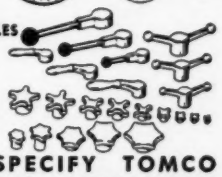
HAND WHEELS Straight Type Offset Type
SPECIALS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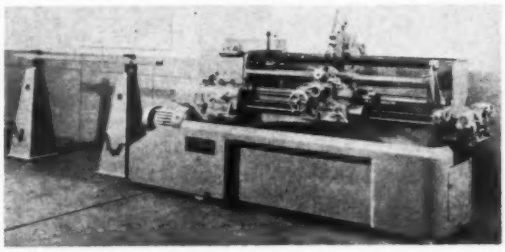
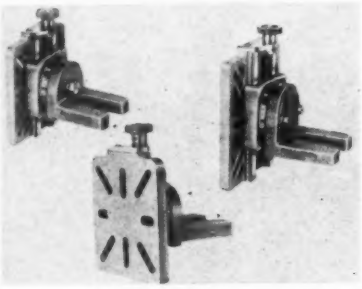
CIRCLE INFORM-A-GRAM KEY NO. 1501

Product News

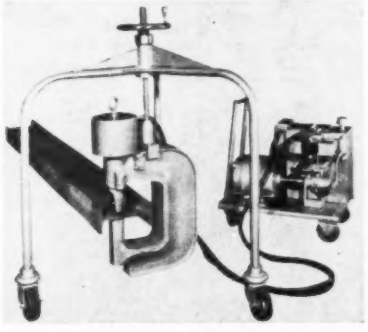


Milling Attachments



For holding large or irregular shaped workpieces, use the new Palmgren 250P and 400P plate-type lathe milling attachments. Vertical feed in thousandths is provided by means of a micro-screw and graduated dial. Chicago Tool & Engineering Co., 8383 S. Chicago Ave., Chicago 17, supplies details, or Circle No. P35.

Portable Presses

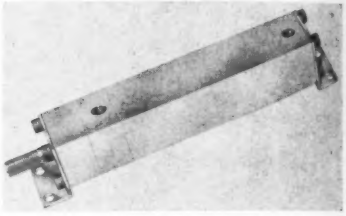


Holes up to 1 1/16" dia can be punched in 7/8" mild steel with the new portable hydraulic punches designed by W. A. Whitney Mfg. Co., 636 Race St., Rockford, Ill. Featured deep throat design permits punching to the center of the web on wide-flange I-beams and channels, and the use of cutaway tools permit punching up close to the leg. Get data from the company, or Circle Inform-A-Gram No. P36.

Centerless Turner

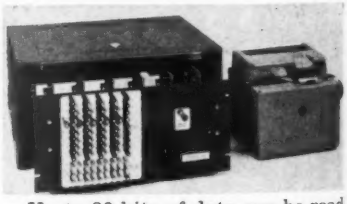
An unlimited variety of tapers, turns, or radii on long slim work, without the necessity of headstock or tailstock centers, is possible with the Turn-omation centerless tracer turning machine. It produces 48" tapers on bars as small as 3/8" and makes a complete turning on a multi-tooth broach in a single pass. All contours are turned with one simple point tool. For details, get bulletin from Taber Instrument Corp., 111 Goundry St., N. Tonawanda, N.Y., or Circle Inform-A-Gram No. P37.

Square Barrel Cylinder



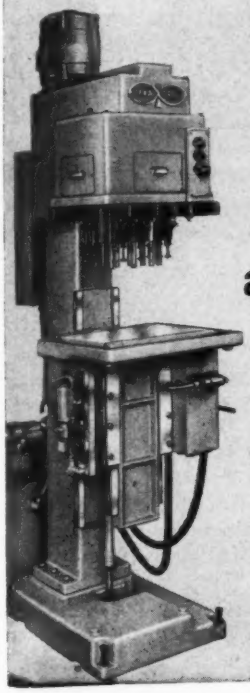
Being perfectly square, compact, small in size, and light in weight, these air and hydraulic cylinders fill many application requirements which conventional cylinders cannot meet. The square sides and heads make it possible to drill and tap along the length of the barrel for mounting. Get literature from Galland-Henning NOPAK Div'n, 2753 S. 31st St., Milwaukee 46, Wis., or Circle No. P38.

Tape Reader



Up to 80 bits of data can be read simultaneously at speeds up to six blocks/sec with the new photoelectric block-reading tape reader. Used for machine tool control applications, this reader requires no clutches or brakes, thus reducing maintenance. For details on Model 200, write Photocircuits Corp., 31 Sea Cliff Ave., Glen Cove, N.Y., or Circle Inform-A-Gram No. P39.

DEKA DRILL



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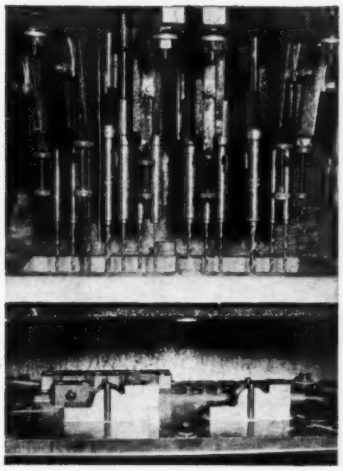
COMPANY: Kleinschmidt division of Smith-Corona Marchant.



OPERATION: Drills three .156 holes 1¼" deep and two ¼" holes 1¼" deep through aluminum extrusions.

TIME OF COMPLETE OPERATION: 12 seconds. Floor to floor—37 seconds!

TECHNIQUE: Nest plate consists of six stations. First and second stations drill three .156 holes ⅝" deep. Parts are turned over 180° in third and fourth stations and new parts placed in first and second stations and three .156 holes are drilled through. Parts completed by drilling two ¼" holes through piece in same manner in fifth and sixth stations. Parts are clamped automatically during drilling cycle by 12 pressure pads on bushing carrier mounted on top leaf of Master Die Set fixture.

PRECISION TOOL AND MFG. CO. of ILLINOIS

DEPT. TP90, 1305 S. LARAMIE AVENUE, CICERO 50, ILLINOIS

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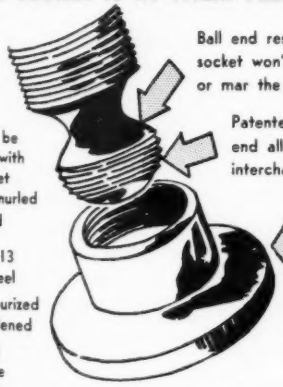
THE SECRET IS IN THEIR FEET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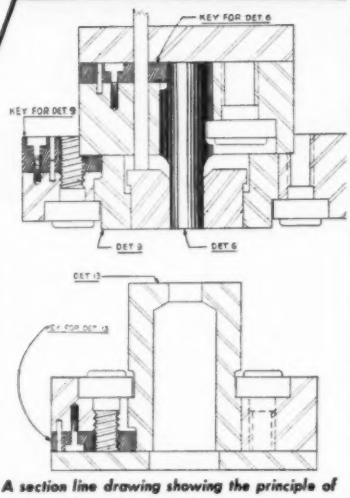
HOVIS KEY-ALIGNED DIE
THE LATEST ADDITION TO OUR STANDARD UNITS

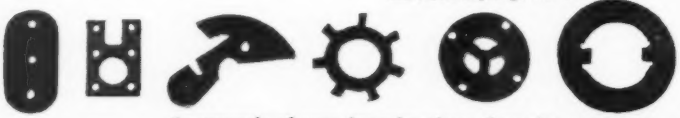
a must for irregular stampings

ELIMINATES ALL SET-UP ERRORS AND INSURES UNINTERRUPTED ACCURACY

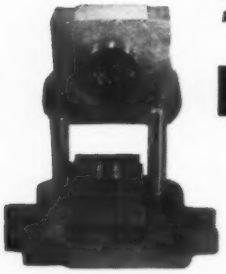
When producing irregular shaped stampings, it is important that the cutting members of the die are located in the proper radial alignment. Hovis has introduced the key-aligned die to meet this requirement . . . With the key-aligned die any press operator can install the inserts without the possibility of misalignment. This is accomplished with a flat on the insert which locates against a key in the retainer.



A section line drawing showing the principle of the Hovis key-align method.



An example of some irregular pieces these dies produce by merely purchasing special sets of parts on which we are glad to quote



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for producing WASHERS and SMALL STAMPINGS . . . No need to make a NEW DIE for every STAMPED PART

By simply removing and replacing five, small, interchangeable inserts a new part may be produced . . . This method makes possible all production including irregularly shaped pieces and shallow draws.

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Many uses —
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53 Brown Ave., Springfield N. J.

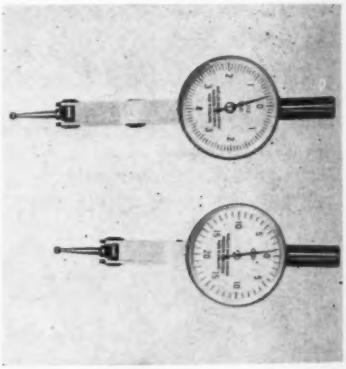
CIRCLE INFORM-A-GRAM KEY NO. 1522

Product News

Hole Bottom Adapter

Surface roughness of the bottoms of holes, slots, counterbores, and any area below the surface level can be measured by the adaptor on the Surfindicator. Model BL-132 measures the surface in bottoms of holes as small as ⅜" ID to a maximum depth of 1". Get data from Brush Instruments, Div'n of Clevite Corp., 37th and Perkins, Cleveland 14, or Circle Inform-A-Gram No. P40.

New Test Indicator



Features of this new model test indicator include continuous clockwise movement when changing direction of pressure on the contact point, and the contact point doesn't slip and operates in a 186° arc. For more information on G301 and G303 indicators, write Mueller Gages Co., 1052-1058 N. Allen Ave., Pasadena, Calif., or Circle No. P41.

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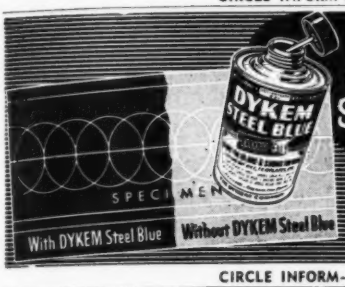

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"Free Running" spindle (Patent Pending) has no drive pressures to cause deflection. (See cut-out below.)

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Revolutionary in concept and design, these lathes deliver extra power and accuracy to the spindle nose.

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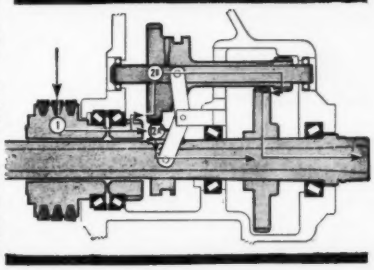

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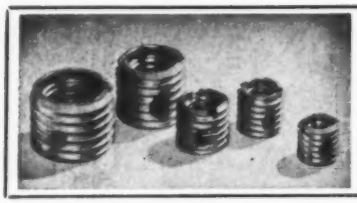

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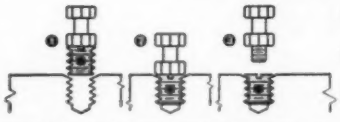

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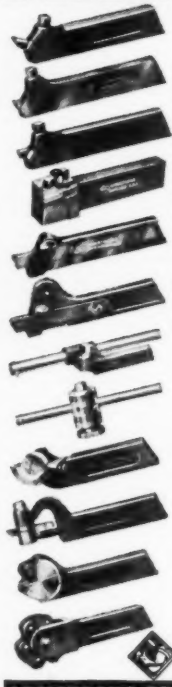

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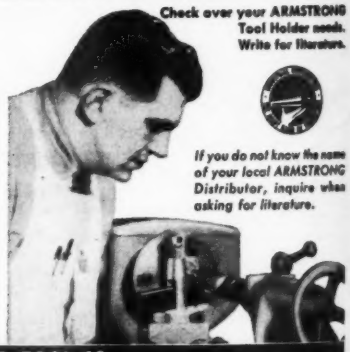

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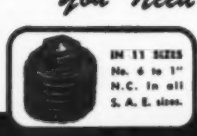

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CUMULATIVE EDITORIAL INDEX FOR 1960 ISSUES

TOOLING & PRODUCTION Magazine

The number of subjects in which T&P's editors present material in just a few issues adds up very rapidly. Most articles are of lasting interest and have future reference value in solving tooling and production problems.

This cumulative index will build up progressively during each calendar year. Each issue will carry a cumulative index of material contained in all previous issues of the same year, with each January issue carrying the complete index of the twelve issues of the previous year.

We suggest you see to it that your copies of T&P are retained for future reference so you can get the full benefit of this useful index.

The Publisher

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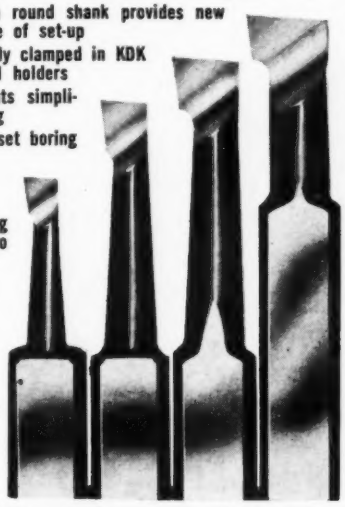

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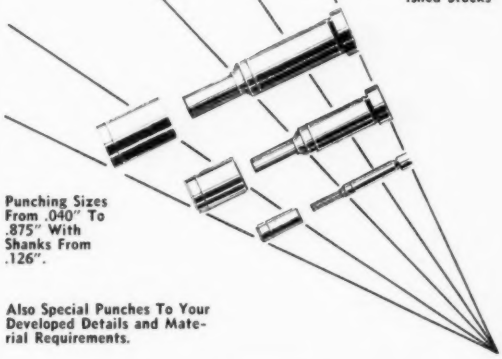

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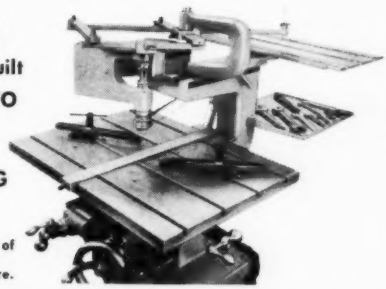

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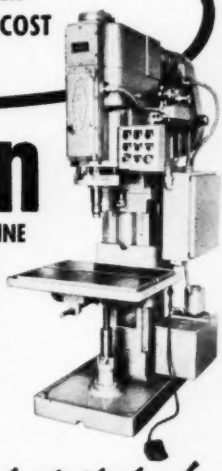

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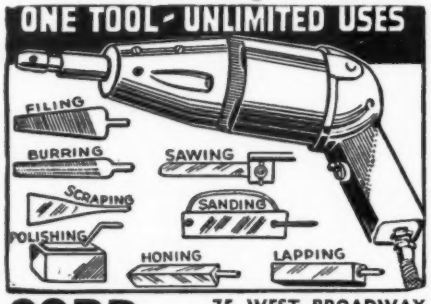

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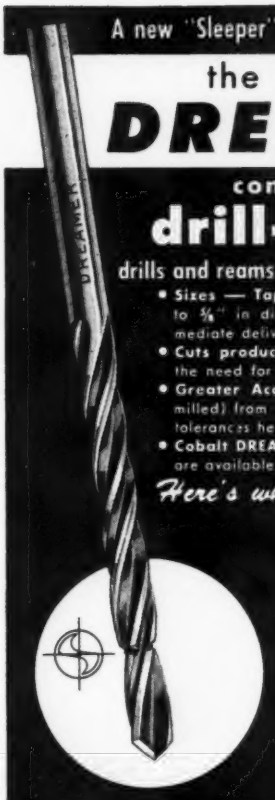

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Give application details for specific information. Ask for prices.

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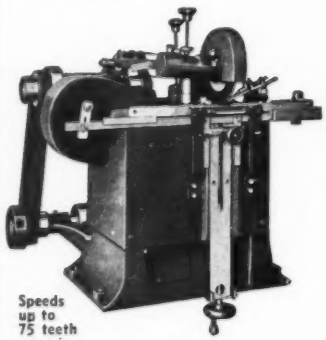

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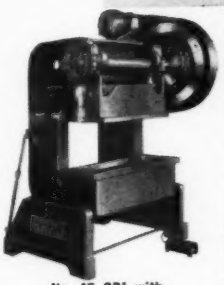

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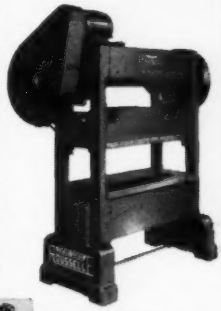

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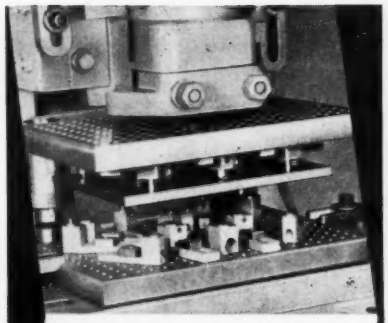

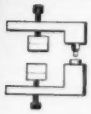

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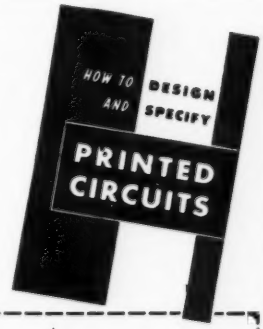

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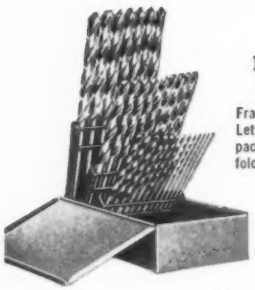

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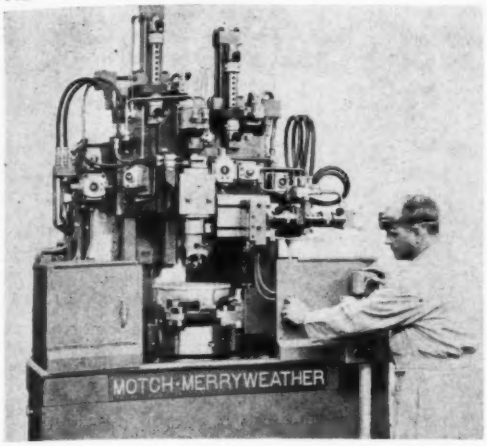
Product News

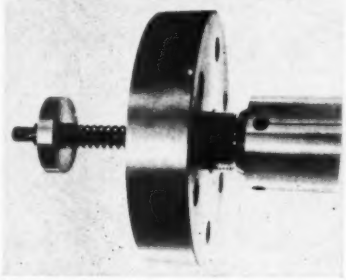
New Vertical Turner



Each of these new vertical turners is assembled from building block components to meet the customer's requirements for boring, facing, and turning, either in rough or finished form. Production changeovers are speedy and efficient because easy remounting of slides on the columns and resetting of cutting tools. Contact Motch & Merryweather Machinery Co., 1250 E. 222nd St., Cleveland 17, or Circle No. P45.

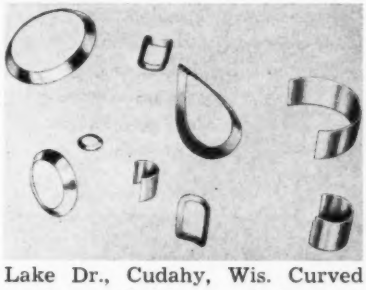
Replaceable Expanding Arbor

Improve holding work for higher precision machining to closer tolerance requirements with this inexpensive expanding arbor assembly. The arbors may be quickly machined for holding any finished bore from ⅝" to 12". Contact Craft, Inc., 2457½ Chico St., El Monte, Calif., for details, or Circle Inform-A-Gram No. P44.

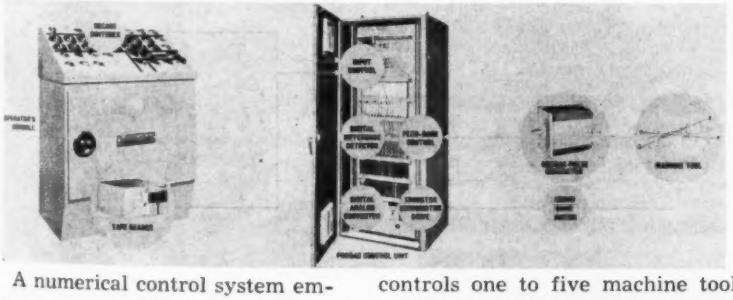


Curved Preforms

A new concept in preform designs for tubular brazing applications has been created by Lucas-Milhaupt Engineering Co., 5051 S. Lake Dr., Cudahy, Wis. Curved washers and shims are being custom manufactured of silver alloys to meet individual requirements. More data is available from the company, or Circle Inform-A-Gram No. P46.



Numerical Control System



A numerical control system employing all-static, all-transistorized circuitry for all automatic machine tool control, is now available from the Westinghouse Electric Corp. The Prodac control unit controls one to five machine tool motions over the 999.999" span and handles auxiliary machine tool functions. Accuracy is ±0.0005". Contact Westinghouse, P. O. Box 2099, Pittsburgh 30, for details, or Circle Inform-A-Gram No. P47.

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Precise measurement to 0.0001" and 1 min. of arc

Gaertner Toolmakers' Microscope

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With the Gaertner Toolmakers' Microscope you make direct, non-destructive measurements — no contact, no distortion, images are sharp and clear. It is a basic measuring instrument for inspection depts., gage labs, tool and die and model shops, industrial and research labs.

The Gaertner Toolmakers' Microscope has been proven in use by U. S. Government Gage Laboratories, and by prime contractors and their subcontractors. With all parties using the same measuring instrument, inspection procedures are co-ordinated and disagreements and rejects minimized.

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HIGH SETTING AND REPEATING ACCURACY

- Low, compact built-in rotary stage reads to 1 minute of arc throughout 360° range.
- Minimum overhang of stages.
- Full 2" precision-lapped lead screws with correction device.
- Straightforward, direct, uncomplicated optical system.

Features that assure you of
EASY, CONVENIENT OPERATION

- Independently rotatable cross hairs in protractor ocular speed up measurements, simplify measuring procedure.
- Convenient location of ocular eyepieces for ease of reading.
- Built-in transformer and plugs for all illuminators.

Modifications and accessories to
MEET YOUR EXACT REQUIREMENTS

- Thread and radius templates, camera and spotting attachments, fine motion focus, variable magnification available.
- If you have a special measuring problem, our staff of representatives will be happy to consult with you. The service and engineering facilities of the manufacturer are always immediately available to help you.

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Designed and manufactured by

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CIRCLE INFORM-A-GRAM KEY NO. 1631

Proper tooling solves time, torsion, and thrust problems. Solving these three problems, Michigan engineers properly adapt modern cutting tools to this double-end turret machine and complete its design for profitable operation. Gas meter bodies are drilled, reamed, tapped, bored, chamfered, and spot-faced at a rate of ten per hour. You can imagine the value of the piecepart at this point, and how inefficient tool changing could cost thousands of dollars per year. That's why tool change *time* is controlled by presetting drills outside the machine in Scully-Jones "Stub-A-Long" chucks. The same chucks solve another problem — *torsion*. Long drills are like torsion springs, and torsional twist or vibration on the cutting edges is proportional to projection. Stubbing

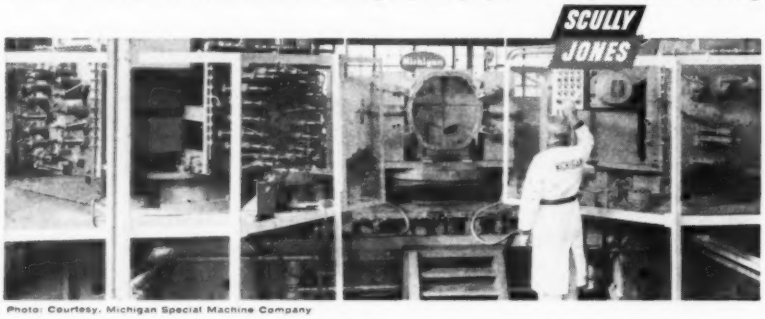
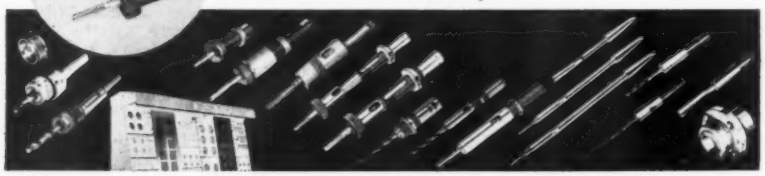


Photo: Courtesy, Michigan Special Machine Company

drills in holders makes them stiffer — reduces chatter and saves drill life. The third problem, *thrust*, is solved by Scully-Jones compression-type tap holders. They compensate for any variation between feed or thrust of spindles and lead of taps. Spring lets tap follow own lead, prevents breakage where previous drilling operations fail to provide hole for tap, and cushions shock to tap and spindle, especially when reversing. These holders also are preset outside the machine. Fast depth adjustments are made by the Quick-Lock nut, which clamps anyplace on the threaded shank of the holder. Your Scully-Jones representative or distributor can show you a complete line of tools that eliminate 80% of tool-change downtime on multiple-spindle machines.

Scully-Jones and Company, 1913 S. Rockwell St., Chicago 8, Illinois



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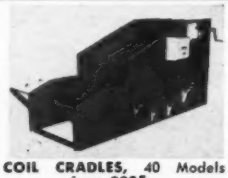

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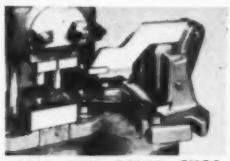

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DRILLING

Precision and Sensitive

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High Speed Model AF-7B

Built for precision drilling from No. 0 to 5/16" diameter drills. Drills to the center of an 11 3/4" circle. Vertical travel ahead—8". Spindle travel — 2 3/4". Speeds 750, 1500, 3000, 6000 RPM. Spindle chuck indicated and guaranteed to .00075".

High Speed Model "U.S."

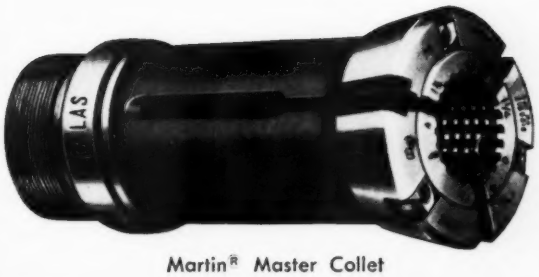
Built for precision drilling from No. 80 to 1/4" diameter drills. Drills to the center of a 6" circle. Spindle feed 2 1/4". Maximum distances chuck to base—14". Available with two drives to give either 2450, 2815, 3080, 3540, or 2450, 3630, 4810 and 6000 RPM. Spindle and chuck indicated and guaranteed to .00075".

All these machines built in accordance with U. S. Government Specification OO-D-676a.

High Speed Hammer Co., Inc.
307 Norton St. Rochester 21, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1643

make your
best machines
perform better...
more profitably



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CIRCLE INFORM-A-GRAM KEY NO. 165

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AT LOWER COST

with versatile, portable all-purpose
DUMORE PRECISION TOOLS

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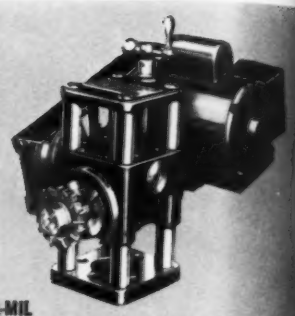
Industry's most versatile grinding machines, may be used with basic machine tools, — lathes, planers, shapers, etc. — to convert ordinary shop equipment into precision internal, external and surface grinders. Dumore offers a complete selection of models up to 3 horsepower with speed ranges up to 42,500 rpm.

DUMORE HAND GRINDERS AND FLEXIBLE SHAFT TOOLS

World famous for dependability, long life and precision performance, Dumore Hand Grinders and Flexible Shaft Tools are the accepted standard for the tool and die industry. Models are available up to ¼ horsepower for heavy duty work. Speed range to 35,000 rpm.

DUMORE PRECISION QUILLS

Precision quills for special set-ups and components for special machines are designed for grinding, drilling and light milling. A complete range of standard sizes and types are available with speeds up to 42,500 rpm. and in lengths up to two feet for internal applications.



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No. 60 to ⅜" Drill Capacity
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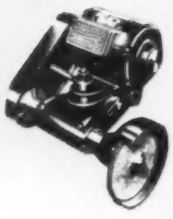
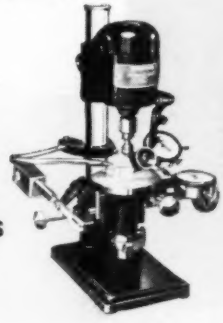
Seven Models
1/20 to ¼ horsepower

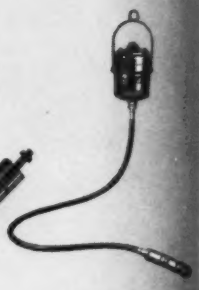


DUMORE TOOL POST GRINDERS
9 Models
1/14 to 3 horsepower



DUMORE MICRO-DRILLS AND SENSITIVE DRILL PRESSES

DUMORE QUILLS
25 Models
5 Types



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